The American Indian

Clark Wissler

GUACANAGARI PONTIAC BLACK HAWK
MONTEZUMA CAPTAIN PIPE KEOKUK
GUATIMOTZIN LOGAN SACAGAWEA
POWHATAN CORNPLANTER BENITO JUAREZ
POCAHONTAS JOSEPH BRANT MANGUS
SAMOSET RED JACKET COLORADAS
MASSASOIT LITTLE TURTLE LITTLE CROW
KING PHILIP TECUMSEH SITTING BULL
UNCAS OSCEOLA CHIEF JOSEPH
TEDYUSKUNG SEQUOYA GERONIMO
SHABONEE

TO PERPETUATE THE HISTORY
AND DEVELOPMENT OF THE
PEOPLE REPRESENTED BY THE
ABOVE CHIEFS AND WISE MEN
THIS COLLECTION HAS BEEN
GATHERED BY THEIR FRIEND

EDWARD EVERETT AYER

AND PRESENTED BY HIM
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1911

THE AMERICAN INDIAN

Ruin known as the "House of the Magician," Uxmal, Yucatan

The American Indian

An Introduction to the Anthropology
of the New World

CLARK WISSLER

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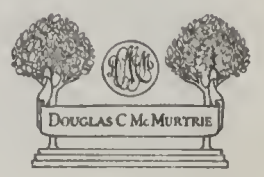

PREFACE

This book is offered as a general summary of anthropological research in the New World. It is in the main a by-product of the author's activities as a museum curator in which capacity he has sought to objectify and systematize the essential facts relating to aboriginal America. Thus, he is first of all indebted to the American Museum of Natural History for the opportunities and resources necessary to the development of the subject and for permission to use the experience so gained in the composition of these pages.

Of personal obligations there are many. All of my associates in the Museum have been most helpful: particularly, acknowledgment should be made to Doctor Robert H. Lowie who read the manuscript and offered many suggestions as to the scope and form of the work. In addition, recognition should be given Professor A. L. Kroeber, University of California, for valuable criticisms; to Mr. Leslie Spier for data on the archæology of eastern North America; and to Mr. Andrew T. Wylie, Teachers College, for suggestions as to the form of presentation. Finally, it is a pleasure to acknowledge my obligation to Professor Henry Fairfield Osborn, President of the American Museum of Natural History, for inspiration and encouragement in the earlier stages of the work.

The technical preparation of these pages was undertaken by my secretary, Miss Bella Weitzner, who compiled the tables of linguistic stocks, the bibliography, and the index, and whose long experience, coupled with extensive anthropological knowledge, greatly facilitated all phases of the work. The specimens illustrated are from the Museum collections. The maps, diagrams, and many of the drawings were executed by Mr. S. Ichikawa who also rendered indispensable assistance in the selection and arrangement of the illustrations.

CLARK WISSLER

June, 1917

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INTRODUCTION

THE term anthropology now stands for the specific science of man. Ethnology, archæology, and somatology are merely divisions, or convenient groups of problems within the scope of this science. The ideal of anthropology is to coördinate all the data concerning man's culture, language and anatomy, past and present, with a view to solving the problems of his origin and the interpretation of his culture. To this end, it must employ the methods of history, zoology, psychology, geology, and the exact sciences, as the case may require. Its pursuit will prove no light task, but to him who has a grasp of some of these subjects and a working insight into the others, anthropology offers problems of the most enticing sort. Naturally, but few of us can hope to grapple first-hand with these great inquiries, but the anthropology of today has moved forward so far that no man who wishes to be considered well educated can afford to ignore its fundamentals any more than he can those of zoology or sociology.

This book, however, is not designed to serve as an introduction to anthropology in general. On the other hand, it deals with one of the two grand world divisions under which the subject matter of anthropology is comprehended, for as we shall see in the course of this discussion, the native culture of the American Indian stands out in sharp contrast to the culture of the Old World. This contrast is due to fundamental differences in the specific cultures of the two hemispheres, which differences naturally tend to form two groups of problems. Yet, the problems that arise in the anthropology of the New World have a great deal in common with those pertaining to the Old. The functions of culture seem to be the same in each; hence, a review of the New World, such as we are now to take up, will at the same time introduce us to the methods and viewpoints of anthropology in general.

Yet, aside from these academic considerations, the American Indian makes an appeal to popular interest. The name oc-

cupies so large a place in our own culture that it may be doubted if there is anywhere in all the land a normal individual who has not acquired some interest in the Indian's history. On every hand we hear: How came the Indian here? Who were his ancestors? What knowledge and habits did he bring with him? What has he accomplished of his own initiative and how did he achieve it? And it is right and proper that every one of us should be interested in these questions, because we have not only displaced the Indian in this land but we have absorbed a great deal of his culture. For instance, what a void we should create if, by some magical power, we could strike from our history, geography and literature all that pertains to his race! Again, what havoc would be wrought by his withdrawal from painting, sculpture and decorative art! But these losses, incalculably great as they are, would be lost in the overwhelming economic vacuity that would result from the obliteration of maize, cacao, manioc, the potato, the squash, coca, quinine, tobacco and all the other numerous and nameless contributions the Indian has made to our culture. From that eventful day in 1492 when Columbus first laid eyes upon the Indian, down to this very hour, he has been the most studied of peoples. No other race of the world can so stir the imagination of the European. It is thus plain that we have before us one of our greatest cultural assets, the source of the most original traits of our present-day culture and a heritage upon which we may realize more and more. Just the other day a student of Indian life in Dakota conceived the idea of training our farmers to raise maize in the great Northwest, in spite of the short season, by using the methods developed by the Indians of the same locality long before the white man's foot intruded. Again, the fashionable lady who goes shopping tomorrow will select new and striking designs on ribbons and silks that are the advance products of a great revival in American decorative art, the foundation for which was laid by our museum collectors and scientific students of Indian life. It behooves us, therefore, to systematize and extend our knowledge of this vanishing race whose life has been trampled under foot in the ruthless march of culture's evolution, but

whose own cultural achievements were too virile and too finely adjusted to local geographical conditions to be obliterated.

Further, the chief concern of scientific anthropology is to solve the very questions of origin that actuate the popular mind. As applied to the New World, the sole objective of anthropology is to discover the origin and conditions which have produced the Indian and his culture. Such questions of origin look simple and innocent enough but, my dear Reader, here are problems whose final solution shall surely put the intellect of man and his scientific methods to a supreme test. Positive and complete answers can not now be given to any of these questions, yet anthropology has something definite to offer on every point, though so far this information lies hidden from the uninitiated reader in the accumulated mass of published data and special literature for the reason that no formal attempt has as yet been made to summarize or to present a general review of New World anthropology as a whole. It is to make up in some measure for this deficiency that the following handbook of the subject is projected.

At the outset, we shall introduce the reader to what appear to be the most important facts in the culture of the native peoples. Such facts are conveniently comprehended under three main headings: Material Traits of Culture (Chapters I to VIII), the Fine Arts (Chapter IX), and Social Traits (Chapters X to XIII). The thirteen chapters devoted to these topics are offered as a review of the data necessary to a more searching and constructive view of our subject. Turning from this descriptive task, we shall first consider the classifications under which all these data may be assembled. The historical development of anthropology as a whole, commits us to a historical and geographical point of view, consequently the basic principle of classification in every case will be geographical distribution. Hence, we take up in turn the problems of the grouping of the living tribes according to culture; the evidences for the distribution of the extinct tribes, if such there be; the distribution of languages; and finally, the problem of somatic types. The completion of this task should leave us with a systematic view of the New World as a whole.

We may, then, profitably consider such synthetic problems as suggest themselves. Among these, by far the most popular, are those dealing with the origins of New World peoples and their culture, their relation to the races of the Old World, and the antiquity of their arrival in the New. These subjects have been many times discussed, but they are here considered as interpretations based upon empirical classifications of scientific data.

As we proceed, the reader will become conscious of a certain asymmetry in the descriptive chapters, but this is unavoidable, for it so happens that we have much more complete data for the United States and Canada than for other parts of the New World. For South America, in particular, the data are quite unsatisfactory. Consequently, most of the illustrative examples and the inductive interpretations in this book are drawn from the best known parts of North America. On the other hand, the data at large are sufficient to reveal the main characteristics of the whole New World and to make clear the fundamental unity that exists throughout. In addition, the limitations of space have necessitated passing over many topics in silence. For example, we have omitted all discussions of warfare and fighting customs, chiefly because these are the most familiar to general readers. Moreover, these subjects are rather fully treated in historical books and tales of adventure, but the reader who wishes to go deeper into the problem may, with profit, consult the writings of Bandelier and Friederici. Another very important point that might be considered is the density of native populations in pre-Columbian times, a subject we should have gladly made room for if there were available reliable estimates. Recently this problem has been taken up by Mr. James Mooney, who is now preparing a publication on the subject. However, when we take into account the modes of life followed in the different areas, it appears a fair assumption that in 1492 the native population was about at its maximum; that is, the hunting areas contained as many people as the fauna would support and the agricultural areas about all that could be provided for under the existing systems. Yet, this may prove an error

when more data are available. Again, the choice of topics has been governed by the importance of the problems involved. Thus, so far, no very important problems have been found in war customs, population, etc., but in forms of social organization, certain industries, art, etc., we do find problems that bear upon the very fundamentals of anthropology. In the preparation of this volume our ideal has been to treat these fundamental problems rather than to present a digest of all possible phases of New World native life.

CHAPTER I

THE FOOD AREAS OF THE NEW WORLD

THE most tangible and objective of human traits are those having to do with food. It is obvious that the fundamental necessity for man's existence is a sufficient quantity of some kind of edible organic substance. Moreover, a retrospect of the world, as we find it today, suggests that one of the eternal problems confronting the several groups of mankind has been the discovery of practical methods for adapting living forms to dietary requirements. For this reason, if for no other, it seems advisable to begin our study of man in the New World with a general discussion of food complexes.

The almost universal tendency among the several groups of mankind is to specialize in some one kind of food which thereby becomes the staple, or main support, to be supplemented by secondary foods when opportunity permits. Even our own very complex culture has not fully overcome this disposition, as shown in our great dependence upon bread and beef. Another characteristic is that this specialization is uniformly distributed over a considerable area. Because of these two conditions our task of classification is far less difficult than if it were otherwise.

Guided by these considerations the New World may be comprehended under eight large food areas, the general boundaries of which are indicated on the map. Thus, beginning with North America, we have in the north a large extent of territory presenting Arctic and sub-Arctic characteristics. This region is the natural range of the caribou, or American reindeer, whose flesh was the main support of the aboriginal populations. On the Pacific slope, centering in the drainage of the Columbia River, we have the salmon area. To the south, in California and a portion of the interior, is the area of wild nuts and seeds. In the heart of the continent is the bison area.

Fig. 1. Food Areas of the New World

Eastern United States is embraced in the eastern maize area. Beginning at the Colorado River and extending down through the Isthmus and the Andean regions to the lower part of Chile, is the area of intensive agriculture in which maize is also the leading food. The interior of the southern continent, centering around the Amazon drainage, is, in the main, a dense tropical forest about whose native inhabitants we have the least knowledge of any. In fact, we cannot certainly characterize the food of the whole area, but inferring the whole from the known parts, we should say that small game and cultivated manioc are the important foods. Finally, the lower part of the continent has certain similarities to the North American caribou area, the chief food animal being the guanaco.

It will be observed that these eight areas can be grouped: three of them being the homes of hunting peoples, three of agriculturists, one of fishers, and one of gatherers of wild seeds.

HUNTING AREAS

In the caribou area live two groups of tribes generally recognized as having little in common, the Eskimo and the Canadian Indians. As we shall see later, this view as to their diversity is in a large measure justifiable, but with respect to food they have close similarities. It is customary to characterize the Eskimo as a people living upon sea mammals, particularly the seal; but we must not overlook the fact that their winter clothing is of caribou skin and that the flesh of that animal is an important part of their diet. However, the severe winters of their extreme northern range drive the caribou southward and leave the seal the only recourse during the period of prolonged darkness. Yet whenever the caribou are in reach the Eskimo places his chief dependence upon them. Thus, while our classification should not be permitted to obscure the large part that sea mammals play in the domestic economy of the Eskimo, the caribou is absolutely indispensable to his existence, not so much for food as for winter clothing. Hence, we see that Eskimo culture must be considered as a modified form of caribou culture.

The Indians of this area, chiefly the Déné and Northern Algonquin tribes, are an inland people occupying the sub-Arctic tundra and the sparse forest belt below it, which gradually shades off into the denser forests of southern Canada. Among these tribes we find the typical caribou culture. Vivid pictures of the prehistoric caribou hunting life have been penned by Hearne [1] and its surviving form by Warburton Pike.[2] In southern Canada the moose and other deer were also available and in the far North the musk-ox; wood bison were also found in a few localities, and hares and other small animals were eaten when needed. Though not reaching the seacoast at any place, these inland tribes had within their range lakes and rivers well stocked with fish, and in season frequented by water fowl. As with the Eskimo, these sources of supply were drawn upon in season. Yet all these foods were merely supplementary, for the people pinned their faith to the caribou and developed their whole feeding and clothing complex around this animal. Consequently the failure of the caribou in any locality for even one season alone would spell disaster.

The methods of hunting are fully described in the descriptive literature of the several tribes, but, as always, such methods are largely dictated by the habits of the animals themselves. Among both the Eskimo and the Indians, the method of killing caribou is to drive or stampede them into artificial or natural lanes or defiles where the hunters are concealed. A variant of this is to run them into deep water, where they are at the mercy of swift canoe men. Snaring is also highly developed, even the largest game being caught in this way. Fishing of whatever kind is with three forms of appliances: the harpoon, the hook and line, and the net. These methods were both known to the Eskimo and to the Indian, though not used by both to the same relative degrees.

The cache is an important invention of this area and has found its way into our own culture. The name is usually applied to an elevated or a subterranean enclosure for storing dried or frozen meat. The caribou, living in great herds, must move forward as they graze over the almost barren tun-

Fig. 2. Cree Indians Driving a Herd of Bison into a Killing Pen
Hind, 1860. I

dra and the hunters must follow with equal speed. So the cache method was devised to solve the problem. The kill of the day is dressed as quickly as possible and then cached, after which the pursuit is again taken up. Thus, each family group will have a number of stores in various accessible places upon which they may draw in case of need.

The bison area is contiguous to the caribou area, but is of far less extent. It is also entirely inland, and like the upper portion of the caribou area, is comparatively treeless, except along the water courses and upon the higher ridges. The tribes formerly residing here are known to us as Buffalo Indians, and no characterization could be more exact. Along the foothills of the mountains, elk were formerly abundant and also mountain sheep, and out on the plains antelope were to be met, but these were obscured by the seething masses of bison, or buffalo encountered everywhere, summer or winter. Edible fish were not abundant, and some of the tribes observed a taboo against them as well as all water animals.

The methods of hunting bison bear certain analogies to those employed in the caribou area. Before horses were introduced, small herds were enticed or stampeded into enclosures where they were shot down at will; at other times they were rounded up by systematic grass firing and while in compact formation attacked at close range by foot men.[3] In favorable times, the surplus meat was dried and packed in bags.

This is a convenient place to note the manufacture of pemmican, a process which appears in some parts of the caribou area, but which seems to be more characteristic of this area. To make pemmican, the dried meat of the buffalo was pounded fine with stone hammers and packed in bags which were then sealed with melted fat. A special variety of pemmican was prepared by pulverizing wild cherries, pits and all, and mixing with the pounded meat. This is known in the literature as berry pemmican. There was also a variety in eastern Canada and New England made of deer and moose meat. When properly protected, pemmican will keep for many months and being compact and easily transported forms an exceedingly valuable food. From the very first it was adopted by Canadian

and Arctic explorers among whom it is still the chief dependence.

In pemmican we have our first good example of the many ingenious processes by which the various groups of mankind have converted raw foods into more serviceable and conservable forms. In all cases, the chief consideration seems to have been its preservation and availability for transport.

The next great hunting area is in South America. From the interior of Argentina to the Horn we have in the main an open country, suggesting the central portion of the United States. There are few trees and in some parts, as the celebrated Pampas, there are rich, grassy plains. At the time of discovery (1492), the fauna here was not so rich as that of the northern continent. Yet the guanaco was abundant. This is considered to be the wild llama, a ruminant having close similarities to the camels of the Old World, but much smaller. Another animal of economic importance was the rhea, or American ostrich. The early accounts suggest that the original human inhabitants of this area were a nomadic hunting people, primarily dependent upon the guanaco, which they pursued with the bola and the lasso. For this reason we shall speak of the region as the guanaco area. In the extreme southern part of the area, or lower Patagonia, we find a condition somewhat like that of the Eskimo, the tribes tending to live more on fish and seals, until we reach the Fuegians, who were almost entirely dependent upon marine fauna.

Spanish colonization soon made great changes in the guanaco area proper by the introduction of horses and cattle.* The latter soon ran wild in great herds like the buffalo of the northern continent, and the former not only ran wild, but were domesticated by the natives. Dobrizhoffer[4] has given us most readable accounts of how completely these natives assimilated horse culture. Some of the Patagonians are still famous for their horsemanship.

Though it is true that in these three great hunting areas the main food was flesh, many vegetable products were used. Even in the Arctic the Eskimo gather berries and edible roots

*Col. Church[5] states that horses were purposely turned into the Pampas in 1535.

Fig. 3. Patagonians Hunting the Guanaco. Wood, 1876. 1

in summer. Throughout the caribou area proper, the berry crop is considerable, and judging from Morice's[6] account of the Carrier some tribes dried and pressed them into cakes for storage. Edible roots also played an important part. As we come southward into the bison area, the flora grows somewhat richer in wild fruits, such as the cherry, plum, strawberry, etc., while in the more arid portions, the prickly pear is abundant. Of roots there were several species, but particularly the prairie turnip (*tipsina*, in Dakota). Even in the guanaco area we find the *Aucaria imbricata*, a kind of pine tree growing along the eastern border of the Andes, bearing abundant nuts, not unlike chestnuts, which are eaten raw, boiled, or roasted. Here also the *algarroba*, or mesquite tree, abounds and from its seeds a food is prepared. In the treeless parts of Patagonia are the prickly pear and a few other scant food plants, while the pampas proper is devoid of all except a few edible grasses. On the other hand, the territory of the Fuegians is fairly well provided with berries which they use, but also produces wild celery and scurvy-grass, of which they make no use.

THE SALMON AREA

All the streams between San Francisco Bay, California, and Bering Strait, Alaska, draining into the Pacific are visited by salmon. These ascend from the sea *en masse* to spawn, constituting a "run," in local speech. As they reach the very headwaters, they are available to all the tribes of this drainage, even those far inland. The run for each species of salmon occurs but once a year and this developed periodic seasonal practices not unlike those of agricultural peoples. As the time for the run approaches, the tribes gather upon the banks of the streams, equipped with fishing appliances, dip nets, harpoons, and weirs, as the local conditions may require. Then when the salmon pass, they are taken out in great numbers, to be dried and smoked. In the interior of the Columbia Basin, the dried fish are afterwards pounded fine in mortars, thus being reduced to a state not unlike pemmican. This pulverized food is carefully stored in baskets as the chief reserve food supply of the year. The tribes on the coast and

outlying islands engage in sea fishing all the year and are almost entirely dependent upon the marine fauna, but those of the interior hunt deer and other game to complete their diet.

Of vegetable foods there are several varieties. Inland, several species of roots are gathered, dried and pounded fine in the same manner as dried fish. The chief root is camas but there are several other species in general use. In their proper season, berries are also very numerous in certain localities.

One striking peculiarity of these inland people is the extent to which they pounded or pulverized dried flesh and vegetables quite like agricultural peoples treat forms of grain. The trait seems to be almost a conventionality and leads one to suspect that the idea was borrowed from their southern neighbors who, as we shall see, were in contact with grain grinders. The tribes of the coast, particularly the indented island-studded part north of Puget Sound, did not have this pulverizing habit, nor did they make very extensive use of roots. Dried fish and berries were their staples. Where available, a kind of clover was eaten green and the inner bark of the hemlock worked up into a kind of bread-like food.

While in this area the tribes of the coast maintained fairly permanent villages; those of the interior were rather nomadic, or more correctly, moved in an annual cycle, according to their food habits. Thus at the salmon run each group took its accustomed place on a river bank; then as berries ripened, they shifted to the localities where they were abundant; later they moved again for the gathering of roots; again for hunting deer, and so on in one ceaseless round. To a less extent this seasonal shifting prevailed among the coast tribes, for by the use of canoes they could readily reach the places sought and return again to their villages.

This correlation between the use of wild foods and instability of residence is perhaps more striking in this area than in the others but, nevertheless, holds for all. The Eskimo regularly shifted from sea to inland and back again as winter set in. Likewise, the caribou, bison, and guanaco hunters, each in their respective habitats, shifted according to seasonal re-

quirements. The more extended and definite annual cycle of the salmon area seems to be due to the fact that each of their staple foods was available for but single short periods of the year, not unlike so many successive harvests of an agricultural people whose fields were far apart.

THE AREA OF WILD SEEDS

The area of wild seeds is often spoken of as the "acorn area," and will frequently be so designated in this work. However, it should be borne in mind that in southern California acorns are found only on the uplands and mountains and that in the surrounding parts and eastward over the Great Basin wild seeds take their place. Yet, since the most typical culture is found in central and southern California, we may consider the acorn the most characteristic food.

At the proper time acorns are stored in large basketry bins to protect them against thieving rodents. The raw acorns are not palatable, for they contain a large amount of tannic acid; however, this objection is eliminated by pounding the kernels into flour and then leeching with hot water. Good descriptions of this ingenious process may be read in the publications of the University of California. From this substance, a kind of bread or cake is made, which proves to be a very satisfactory food, but even here this is supplemented by foods from several varieties of wild seeds, roots, herbs, and grasses.[7] The tribes on the eastern side of the mountains out on the arid plateaus are forced to get along without the acorn and in consequence eke out their living from but a scant flora. One peculiarity of the area is the rarity of berries and fruits, which is in contrast to the interior of the salmon area.

The term "digger," generally applied to the natives of this area, was suggested by their persistent gathering of roots and plants. It was also an expression of contempt due to the contrast between the scanty diet of these Indians and those of the bison area with whom travelers were more familiar. Likewise, the fauna was not particularly favorable. Deer were to be found in the mountains, but rarely in large numbers, and small game animals were not numerous. In the eastern part,

the rabbit was an important item, and as noted above, salmon were caught wherever they made "runs," and other fish were used when available. Likewise, the coast people depended to some extent upon the marine fauna. Thus, notwithstanding the popular idea of modern California as an ideal habitat for us modern Americans, it must be regarded as rather unfavorable to the development of primitive tribes, for while enough food could be found, the daily routine of gathering it in small bits was time-consuming in the extreme. Moreover, in parts of Nevada, Utah, and Idaho the margin of even this sort of food was so narrow that many species of insects were eaten.

THE AGRICULTURAL AREAS

There are just two cultivated native food plants, maize and manioc (cassava), that rise to the level of chief staples. Both take the highest rank in excellence among the world's foods, and after the epoch-making discovery of Columbus were quickly spread to other parts of the world.[8] The uniqueness of these plants and the sharp contrast they make when compared with the cultivated staples of the Old World, is the strongest possible argument for the independent development of American culture.

In the first place, we have a distinct agricultural area in the eastern half of the United States, including a very small section of Canada. The chief crop was maize, on which account we speak of this division as the eastern maize area. Although its contact with the great agricultural area of Mexico and the South is slightly broken in Texas, we have no reason to doubt a historical connection between the two areas, and consequently we may consider them as parts of the same whole. The remaining inland boundaries of this eastern maize area mark the approximate climatic limits to its growth. These limits also define the distribution of agriculture, from which we have reason to infer that the introduction of that art did not precede the introduction of maize culture. However, this is a problem to be discussed later. We see, then, that the Indian tribes had extended agriculture in the East to its physical limits. The stretch of country from Louisiana to Maine pre-

sents considerable climatic variety which is reflected in the aboriginal crop lists, for though maize was grown throughout, it seems to have been more exclusively toward the north. Roughly considered, in the northern half of the area, the crops were squash, beans, and maize, all planted in the same field, while in the southern half, maize was supplemented by a kind of millet, and squashes gave way to melons, sweet potatoes, and gourds.

Tobacco, though not strictly a food, may be noted here. It was extensively grown in the South, and its cultivation carried as far north as the climate permitted.

Wild plants were also abundant and many species were used. Parker's [9] exhaustive study of Iroquois foods shows how completely that people drew upon the contiguous flora. From the data at hand, we have reason to believe that in the South a still greater number of species were eaten. In the far North wild rice became almost a staple; but while, as Jenks [10] has shown in his laudable investigation of this food, it was sometimes planted by the natives, it was not truly domesticated as was rice in the Old World.

Of manufactured foods, other than those made of maize, maple sugar takes first place. Practically every essential detail of the process now in use was developed by the Indians of this area before 1492. The sugar maple being a northern tree, the trait is almost peculiar to the northern half of the area, though the box elder and a few other trees have, in later times at least, permitted a makeshift extension of the art. That any kind of sugar was made in the South is doubtful.

Another food deserving mention is oil derived from hickory and walnuts. This oil was highly characteristic of the south and added a valuable element to the otherwise starchy diet. In early days the natives did a good business in supplying this oil to the colonists. In some parts of the Atlantic coast plain tukahoe (a fungus) bread was made, and in the south, persimmon bread.

Of foods and dishes made with maize there is a long list, which is in the main the same as we ourselves use. Two noteworthy studies of this aspect of maize culture by Carr [11] and

Figure in the American Museum of Natural History

Fig. 4. Iroquois Woman Pounding Maize into Meal

Parker [12] show how completely the white colonists absorbed the maize complex of the Indians.

One important characteristic of agriculture in this area is that it was woman's work, the man being a hunter. This sexual division of labor tended to give a well-balanced diet, but was not constant throughout, for in the far North where agriculture dwindled out into the caribou area, vegetable foods were decidedly in the minority, while in the extreme South, where agriculture was rather intense and the flora rich, the fruits of the chase were in the minority. The chief game was the deer. The bison of the prairies found its way as far east as the Alleghanies, but except in the open country was not an important item. The wild turkey and various small game were also abundant. Fish were taken where found by the usual methods, but in the south the use of poisons was general.

Next we turn to the great area of intensive agriculture, the only one in the New World, where work in the fields is not regarded as woman's work exclusively, and in which hunting ceases to be an occupation. As may be anticipated, it is also the home of the most advanced Indian cultures. We see from the map that it extends to about 35° on either side of the equator and is thus almost entirely within the torrid zone. On the other hand, all of this surface, except a narrow coast belt and a few intervening valleys, is the most elevated land in the New World. It is upon these highlands exclusively that maize was grown. Furthermore, there is a general tendency to aridity throughout, which, combined with the elevation, gives a very favorable climate. It is just the region where the most intensive cultures would be anticipated. As we proceed with the later sections of this book, the reader may be appalled at the complexity and variety of peoples in this area; hence it is fortunate that at the outset we are able to see one element of unity in the whole.

Beginning with the north, we have the pueblo-dwelling peoples of southwestern United States and northern Mexico. Besides maize, beans, melons, squashes and sunflower seed were the chief crops. In historic times, at least, onions and chili peppers were favorite garden plants; and according to

PLANTS CULTIVATED BY THE NATIVES OF THE NEW WORLD BEFORE 1492

The following list enumerates the most important plants originally cultivated by the several Indian tribes before the discovery of the New World in 1492.

Name	*Area of Cultivation*
Agave, or aloe (*Agave americana* Linn.)	Mexico to Chile
Alligator pear (*Persea gratissima* Geartn. f.)	Central America and West Indies
Arrowroot (*Maranta arundinacea* Linn.)	Tropical America
Barnyard grass (*Echinochloa crusgalli* (L.) Beauv.)	Mexico and southern United States
Bean, kidney (*Phaseolus vulgaris* Linn.)	Distribution same as maize
Bean, Lima (*Phaseolus lunatus* Linn., var. *macrocarpus* Benth.)	Brazil and Peru
Coca, or cocaine (*Erythroxylum coca* Lamarck)	Peru and Bolivia
Cherimoya (*Anona Cherimolia* Miller)	Peru and Brazil
Cashew nut (*Anacardium occidentale* Linn.)	Tropical America
Capsicum or Chili pepper (*Capsicum annuum* Linn. and *Capsicum frutescens* Linn.)	Tropical America
Cacao (*Theobroma cacao* Linn.)	Tropical America
Corn (See maize)	
Cotton (*Gossypium barbadense* Linn.)	Tropical America
Guava (*Psidium guajava* Linn.)	Tropical America
Gourd (*Cucurbita pepo*, var. *ovifera* Linn.)	Distribution same as maize
Jerusalem artichoke (*Helianthus tuberosus* Linn.)	Mississippi Valley
Maize (*Zea mays* Linn.)	See map (Fig. 5)
Manioc (*Manihot utilissima* Pohl.)	See map (Fig. 5)
Maté or Paraguay tea (*Ilex paraguariensis* St. Hil. and *Ilex conocarpa* Reiss.)	Paraguay and western Brazil
Madia (*Madia sativa* Molina)	Brazil
Potato (*Solanum tuberosum* Linn.)	Chile
Pumpkin (*Cucurbita pepo* Linn.)	Chile and Peru
Prickly pear or Indian fig (*Opuntia ficus-indica* Mill.)	Temperate North America
Pineapple (*Ananas sativus* Schult. f.)	Mexico
Peanut (*Arachis hypogœa* Linn.)	Mexico and Central America
Papaw (*Carica papaya* Linn.)	Peru and Brazil
Oca (*Oxalis tuberosa* Molina)	West Indies and Central America
(*Oxalis crenata* Jacq.)	Chile and Bolivia
Quinine (*Cinchona calisaya* Wedd.)	Chile and Bolivia
(*Cinchona officinalis* Linn.), and others	Bolivia and Peru
Quinoa (*Chenopodium quinoa* Willd.)	Bolivia and Peru
Sweet potato (*Ipomœa batatas* Poir.)	Colombia and Peru
Star apple (*Chrysophyllum cainito* Linn.)	Tropical America
Squash (*Cucurbita maxima* Duchesne)	West Indies and Panama
Tobacco (*Nicotiana tabacum* Linn.) and other species	Tropical America
Tomato (*Lycopersicum esculentum* Mill.)	See map (Fig. 8)
	Peru

local conditions, the following wild plants were largely used: piñon nut, mesquite, bean and saguaro. Tobacco and cotton were cultivated. Fish as food was not an important factor, in fact, it was under the ban of some tribes. Game was rather scarce, rabbits being the most numerous. Turkeys were domesticated. Of prepared foods, the most unique is the piki maize bread, made in thin, paper-like sheets.

For the remainder of the North American part of the area the Nahua and Maya may be taken as the types. Here agriculture was more highly organized than in any of the areas we have discussed. With the former, maize is made into peculiar cakes called "tortillas," which, with beans and the inevitable chili pepper, constitutes the usual menu. If we add to this cacao we have the list for the Maya also. In the lower parts, especially in Central America, there were many fruits, many of which are now cultivated by Europeans, as the mammae apple, the alligator pear, the cashew nut, together with the fleshy stalk of its tree, the tomato, pineapple, etc.

The Andean region of South America is peculiar in that at almost any point one may shift from high to low valleys, thus quickly passing through several varieties of climate. Likewise, one may, by lateral shifting, encounter deserts and the most well-watered stretches in succession. All this tends to nullify the effects of changing latitude, so that the aggregate agricultural conditions in Colombia, Ecuador and Peru can be made the same. Still we find some cultural differences.

The Chibcha peoples of Colombia in the highlands raised maize, potatoes, sweet potatoes, manioc, beans, tobacco, coca, and cotton. They did not have the llama, and game was scarce, but carefully protected and conserved. The other peoples of Colombia did more hunting, but in addition still cultivated maize. Salt was manufactured in favorable localities and formed an important article of trade.

The adjoining highlands of Venezuela formerly had a hunting and maize-growing population which was exterminated by the Spaniards.

Ecuador was partly under the control of the Inca at the Spanish conquest but, no doubt, still retained its former food

habits. Its population was almost exclusively agricultural. Maize was the staple except on the highest levels, where quinoa was substituted. Potatoes were universal, and coca, peppers, and other plants in the lowest valleys. On the coast there was fishing.

To the south was the Inca empire with its highly organized agriculture. Here the crops were about the same as for Ecuador, but in favorable places manioc, ground nuts, beans, gourds, tomatoes, guava, and fiber plants were raised. Hunting was carried on in an organized manner, large drives being made over great areas. The game animals were chiefly the guanaco and vicuña, of which the flesh was often dried and stored for the use of the army. The familiar term "jerked meat" is believed to have come from the *charqui*, as this dried meat was called in Peru. Birds were taken in nets, and on the coast there was some fishing.

The great basin of the Amazon with the adjoining coast is one of the world's most typical tropical areas, but almost everywhere throughout there was some native agriculture. As a whole, the area presents some geographical variety, for the eastern part of South America also has its highlands, though far less pretentious than those of the West. Here, however, the elevation was much less; consequently, maize did not become the chief cultivated food, manioc, or cassava, taking its place. Otherwise, the range of plants was about the same as in the Andean region. Tobacco, potatoes, and cotton were common. The celebrated maté, or Paraguay tea, and the edible clay of the Botocudo peoples are the principal unique features. Yet, in no case were the tribes of these highlands so dependent upon agriculture as were those of the west coast. In this respect they present a close analogy to the eastern maize users of North America, with whom they are geographically connected by the West Indies. Further, the almost complete delegation of agricultural responsibilities to the women is in itself an indication of the large part hunting played in their sustenance.

Finally, we come to the interior of the continent where high temperature, low elevation, and abundant moisture combine

to produce rank flora. Our knowledge of this area is still rather scant, but what information we have indicates that the whole interior Amazon Basin with the contiguous east coast noted above should be considered as one distinct food area. That the art of agriculture is now absolutely unknown to any of the Amazon tribes is doubtful, because far into the interior we find manioc, tobacco, coca, pumpkins, sweet potatoes, etc., growing in the village fields. Also, maize has been reported from a number of localities, though the climate is unfavorable to it. The blowgun with poisoned darts is used in hunting, the game consisting largely of birds and small tree-climbing animals. No living thing is so abundant as to offer opportunity for food specialization, and the native must make use of everything he can lay hands upon. On the upper Amazon and elsewhere the taking of fish by poisoning the water is common. A very characteristic dish of this whole area is the "pepper-pot." Small game of whatever kind is cast into a pot and boiled into a thick broth made hot with peppers. The pot is rarely emptied, but the contents continually augmented.

GENERAL DISCUSSION

Now that we have gained a general perspective of New World food traits, we may note some of their most distinctive characteristics. It is clear that the art of agriculture centers around maize, for almost everywhere we find it grown. Its only rival is manioc, but, as we have seen, this plant is resorted to only in spots where it is too moist for maize. In the same way, the quinoa displaces it in the highest altitudes of the Andes. But this only serves to show how maize dominates aboriginal agriculture. We can be quite sure that if we knew the full history of this plant we should have a good insight into the development of the higher cultures of Mexico and Peru, yet in spite of its obvious importance, very little attention has been given to the subject. Though this homely art of maize culture is still practised by many surviving natives, the only field studies we have approaching a satisfactory standard are those of Parker [13] for the Iroquois, Hough [14] for

Fig. 5. The Distribution of Maize and Manioc

the Hopi, and Wilson [15] for the Hidatsa. For the Pueblo peoples who still raise maize in the aboriginal way we have little more than the pioneer work of Cushing.[16] With respect to Mexico and the Andean region the literature is even more fragmentary. While we do have a great deal of more or less generalized information, this has been re-stated so often that it is difficult to weigh it and even the very best of such literature can never take the place of exhaustive field studies. For example, it is only from the works of Parker [17] and Wilson [18] that we can form a definite conclusion as to how closely the cultivation of maize of white farmers follows aboriginal patterns.

However, the gross characteristics of aboriginal maize culture are clearly known. In the first place, no beasts of draught were employed, but all was by hand. Nowhere do we find a plowing machine drawn by men. As an independent proposition it may seem strange that the Peruvians, with all their genius, should have missed the idea of harnessing either men or llamas to a digging tool, but when we note that maize grows best in bunches or "hills," while the Old World inventors of the plow sowed grain broadcast, we find a partial explanation. The heaping up of earth around the growing plant is still one of the fundamentals in maize culture. It is a fair assumption that the hoe is an aboriginal solution of the practical problem involved here. The mere sowing of grain by the ancients of the Old World was the one great problem, for after that there was little to do until the harvest, while in the case of maize the tending of the crop was the most exacting. The former presents a much simpler mechanical problem than the latter; in fact, it is not until 1731 that we hear of a horse cultivator in England.

The aborigines dug up the ground with pointed and spade-like tools. From New Mexico to Chile, spade-like tools with foot-rests for thrusting into the ground were common, but in the eastern parts of both continents we find a simple digging stick. In Peru the digging tools were sometimes pointed with copper and bronze.

The hoe was universal in the eastern maize area and seems to have extended into the West Indies, but from New Mexico

Fig. 6. Pueblo Indian Planting Maize

Fig. 7. Cultivating Maize and Squashes with a Bone Hoe. Hidatsa Indians

southward it does not appear in our collections. The significance of this is not yet clear. The data for the eastern maize area show us that the agricultural pattern was to hoe up hills around the plants. As stated before, maize, squashes and beans were often put in the same hill. Tobacco was planted in hills and so were the sweet potatoes of the south. The first Atlantic colonists adopted the hoe pattern of the native, especially in the south, where to some extent it still survives.

Artificial fertilization was practised from Nova Scotia to Chile. One method, widely distributed in both continents, was the placing of fish in the maize hill. Manures, both human and animal, were used in parts of the area of intensive agriculture. So particular a correspondence as planting with fish, reported for localities between New England and Peru, points clearly to a common origin, but it is the study of the maize plant itself that affords the strongest argument for diffusion from one center. The investigations of Harshberger [19] and Collins [20] indicate that maize was developed from a wild grass of the Maya habitat. The distribution from this center of varieties once so developed would readily account for the uniformity of maize culture we have noted. Unfortunately, no careful study of the aboriginal varieties of maize has been made, but the data at hand suggest that about all the distinct kinds we still have on our farms were in existence by 1492 and that they existed side by side in the same fields. The time required to stabilize all these forms and the subsequent precision of domestic routine that preserved their racial integrity to the present among some of the surviving natives, is one of the most impressive facts of our subject.

So brief a review as this must needs pass over in silence many interesting points, but we should give passing notice to the evidence for the local adaptation of these widely distributed varieties of maize. Wilson [21] has shown that the Hidatsa of the upper Missouri have trained certain varieties to ripen early and within the limits of the short season, a characteristic the maize of our eastern farms does not manifest. Collins [22] makes clear that the Pueblo tribes of New Mexico and Arizona have developed varieties with long, deep-

growing root habits to reach the moisture in their very arid fields. These are, no doubt, but suggestions of many other adaptations awaiting discovery and which present very interesting chronological problems.

The art of irrigation was known from Arizona to Chile, and in Peru was carried out on a scale scarcely equalled by modern nations. The remains of aqueduct systems in the Andes show such genius and organization that our respect for the native American rises to a high point.

The alternate of maize, cassava, or manioc, deserves special consideration. Though requiring a more tropical habitat than maize, it also requires a fairly dry, sandy soil. At the period of discovery it was found in the West Indies, Central America, and even in Florida. The poisonous nature of the juice leads to a mode of preparation described fully in the special literature.[23] The essential procedure is to grate the pulpy parts and squeeze them in a basketry press called a *tipiti*. The pulp is then made into cakes and heated to drive out the remaining volatile poison, finally giving cassava bread, which is a staple food.

If we now take a general view of the data at hand it appears a fair assumption that the prevailing type of agriculture was developed by a centrally located highland people and thence diffused, without essential modification, both to the north and to the south. While our experience shows that the art could have been extended farther to the extremes of the continent, it is doubtful if the aboriginal type could have been greatly extended without fundamental changes. In other words, the more primitive hunting tribes of the north and south borrowed the trait one after the other, so far as their habitat permitted.

DISTRIBUTION OF NARCOTICS

In connection with this discussion of cultivated plants some note should be made of aboriginal narcotics. The best known are tobacco and coca, both extensively cultivated in aboriginal times, as shown on the distribution map (Fig. 8). The narcotic element in coca is cocaine, a modern derivative.

Fig. 8. Distribution of Coca and Tobacco

The native, however, simply chewed the dried leaves mixed with lime or other alkalis. Such coca chewing still prevails in the area indicated on the map and has spread to the natives of other parts of both continents, as well as to the whites themselves.

As will be noted, the chewing of tobacco is found in South America contiguous to the coca-chewing area, but it also occurs on the Pacific Coast of America.[24] One peculiarity of the latter habit is that the tobacco is taken with pulverized shells or ashes, ground fine in mortars; in other words, after the coca method. The appearance of this trait in these two disconnected areas and its analogy to the betel nut culture of Melanesia and southeastern Asia is truly puzzling.

The taking of snuff is also largely correlated with chewing, since we find it in both the chewing areas, though it extended rather well over the Amazon country and even to the West Indies. However, the usual substance for making snuff powder is said to be the *Acacia niopo* berry. Along with chewing tobacco go various forms of eating, drinking, licking, etc.

Yet, the most widely distributed method of using tobacco was smoking, of which three aboriginal forms can be localized. First, we have the true pipe found in the greater part of the United States and Canada and in the lower Atlantic side of South America; secondly, the cigar in the West Indies and the greater part of the Amazon country; and lastly, the tubular pipe in western United States, Mexico, and Central America. The usual form of this last is a small section of cane stuffed with crushed tobacco to which the name cigarette is applied. These methods of smoking are not so exclusively localized as the map would imply, but grade one into the other.

The map indicates the approximate extent of smoking in 1492, but as we all know, the custom was quickly carried to all parts of the world, both savage and civilized. The Asiatic peoples have a distinct type of pipe and a different method of smoking, which in late times has reached the Eskimo of Alaska from Siberia.

1. Hearne, 1795. I.
2. Pike, 1892. I.
3. Allen, 1876. I.
4. Dobrizhoffer, 1822. I.
5. Church, 1912. I.
6. Morice, 1906. I.
7. Merriam, C. Hart, 1905. I.
8. Laufer, 1907. I.
9. Parker, 1910. I.
10. Jenks, 1900. I.
11. Carr, 1896. I.
12. Parker, 1910. I
13. Parker, 1910. I.
14. Hough, 1915. I.
15. Wilson, G. L., 1917. I.
16. Cushing, 1884. I.
17. Parker, 1910. I.
18. Wilson, G. L., 1917. I.
19. Harshberger, 1893. I.
20. Collins, 1914. I.
21. Wilson, M. L., and Atkinson, 1915. I.
22. Collins, 1914. I.
23. Im Thurn, 1883, I.
24. McGuire, 1899. I; Krause, 1885. I.

CHAPTER II

DOMESTICATION OF ANIMALS AND METHODS OF TRANSPORTATION

THE domestication of animals and methods of transportation may be treated as a single division of our subject, because from the standpoint of Old World culture, one of these concepts calls the other promptly to mind, and even in aboriginal America there is found some relation between the two. The most common domesticated animals were the dog, the llama, and the related alpaca. There were no others. It is true that we have on record instances of individual animals of other species being tamed, but in no case were they propagated.

Of birds, we have the turkey of Mexico and of the Pueblo tribes of the United States. Lawson [1] is responsible for the statement that in Carolina cranes were bred in captivity, while, according to Roger Williams, the Narragansett trained hawks to guard their fields. But all these are exceptional cases. Also, eagles and serpents were sometimes confined for ceremonial reasons, but not truly domesticated. The bee was domesticated in Mexico by the Aztec and the Maya, as is still the case among some groups of natives in Central America and northwest Brazil.

The dog appears in Paleolithic Europe in close association with the remains of man and was practically universal in aboriginal America. The history of its development and dispersion over the earth would in a large measure be the history of man's cultural achievements. It is thus quite natural that we have a large body of literature on the dog. Unfortunately, this is largely speculative, whereas what we need for our discussion is actual investigation.

The available data indicate that in the New World dogs served at least four purposes: transportation, hunting, guarding and companionship, or food, according to locality. They

Fig. 9. Distribution of Animal Transport

varied greatly in size and form, from the small, pug-like type found in Peru and the hairless variety of the tropics, to the great hairy beasts reared in some parts of the Arctic. Since it is certain that all dogs will readily cross with wolves and foxes and yet tend to remain fertile, the preservation of these types must have required some selective breeding. The only definite study of native dog culture so far made is that of Wilson [2] for the Hidatsa (Siouan) which reveals a complex not inferior to that for agriculture. The Peruvians are credited with three distinct varieties of dog, the contemporaneousness of which necessitates our assuming the existence of breeding control similar to that exercised by us. However, since the methods of propagation are unknown, except for a few northern localities, a comparative discussion of the subject is out of the question.

Dog transportation, on the other hand, has received careful consideration. The most striking characteristic is its limited distribution, for, notwithstanding that the dog occurs everywhere, its use in transportation is confined to the caribou and bison areas with very narrow fringes in those adjoining. Above the forest line dogs were made to draw sledges, a trait quite characteristic of the Eskimo, but found among the most northern Indians of Canada as well. These sledges have straight parallel runners and do not differ essentially from our own simple farm types. There are different methods of harnessing, but for the most part the dogs are hitched by long single traces and run somewhat fan-shaped with the leader at the apex. Excellent descriptions are given in Arctic books of travel.[3]

In all the wooded parts of the caribou area a toboggan is used, the snow being rather too soft for sledges. This is also the great snowshoe area. While dogs were used to drag these toboggans, the hunters themselves not infrequently drew them. The early development of the Canadian fur trade by the Hudson's Bay and French companies greatly stimulated dog traction and greatly increased the use of sledges where ice conditions permitted. The former southern limits of the toboggan are not certainly known but it seemed to end with the

Ojibway and Iroquois, though it may have been used along the upper Missouri.[4]

In the spring and summer dogs were made to bear packs and drag tent poles.[5] This method was more widely distributed than the use of sledges and toboggans, covering the entire caribou and bison areas and extending somewhat into the inland portion of the salmon area. In the bison area, particularly in the northern part, we find an original contrivance known to us as a travois. Though of two or three varieties, the essential structure is the same throughout—a V-shaped frame with an intervening section of net or wood upon which the load is placed.[6] The structure suggests that this travois is merely a development of the pack and trailing tent poles, the more widely distributed method.

It may be worth noting that dog packing in particular is a concomitant of those hunting tribes following a regular migratory circle. The excursions of the Eskimo to the caribou ranges, the corresponding shifts of the Canadian Indians, and the bison-hunting expeditions of the Plains were in pre-Columbian days facilitated by pack trains of dogs. The intrusion of this method into the inland salmon area is consistent with the journeys then made to gather food, as we have stated. On the contrary, topographical conditions in California made large movements unnecessary, which may be one reason why dog packing was not adopted. The maize areas were more independent and had little use for this trait. So far as we know, dog transportation was not in vogue in the area of intensive maize culture. Mexico and the Pueblo area had no way of land transport except by human carriers, and it is not until Peru is reached that the use of the llama comes to notice. This small, camel-like animal has little more carrying power than a large dog, but is particularly well adapted to mountain travel. For the remainder of South America our information is vague, but so far there is no reason to believe that the dog or any other animal was used for transport.

All this suggests that dog traction was intrusive to the New World. When we recall that in Europe and Asia the dog and reindeer are used to draw sledges and that the trait is

Fig. 10. Eskimo Dog Sled

Fig. 11. Indians of the Bison Area on the March, Using the Dog Travois

continuous from Scandinavia to Greenland, this assumption seems justified. Yet, the problem is far from simple. The situation in the Old World is complicated by the presence of horse culture which appears as an early development and by the domestication of the reindeer. Either or both could have greatly stimulated dog traction, but on the other hand, dog traction could have developed in America and spread into Siberia. That it came in with the earliest Asiatic settlers is improbable, since in that case, though not necessarily, we should expect to find it surviving in southern South America. It is also true that the method of hitching in America is different from that in Siberia and contiguous parts of Alaska, and that nothing like the travois is found there.

Returning to our subject, we see that the prevailing mode of land transport in the New World was by human carrier. The wheel was unknown in pre-Columbian times. The wild fauna afforded nothing like the horse and ox of the Old World. The caribou has been found far less suitable for domestication than the closely allied reindeer, and the bison has proved itself rather too strenuous. Yet, these are not sufficient excuses. The plain fact is that the tribes in contact with these animals were relatively primitive. It is fair to assume that if the bison and the caribou had been available to the Peruvians, the tale would be different.

Before the time of Columbus, no tribe had an animal able to carry a man. The dog packers walked in front of their trains, and even the Eskimo walked more than they rode. The coming of the Spaniards made quick changes. The mule and donkey were soon in general use in the area of intense maize culture, though they have not yet entirely displaced the llama in Peru. Wild cattle soon overran Texas and southern California and in the Pampas became almost as numerous as the bison in the North. Their presence greatly modified the food supply, but the most far-reaching change resulted from the spread of the horse.

By direct instruction or mere self-initiated imitation, the natives of the bison and guanaco areas acquired horse culture. Unfortunately, the history of this cultural acquisition is lost,

but we know that the use of the horse spread much faster than exploration, so that in many cases our first actual view of a tribe is as a horse user. The bison in the North and the guanaco in the South, supplanted later by wild cattle, presented almost parallel environments. In Europe at the time of Columbus, the horse was used almost exclusively by soldiers and aristocrats as a riding animal, mules for packing and bearing the common folk, while carts and plows were drawn by oxen. This horse-riding complex was thus readily adaptable to the native culture of these two areas. At least they seem to have taken it over as a whole, for saddles and other riding appliances are of the same European patterns both south and north.[7]

The important differences between the horse cultures of the two areas appear in the adaptations made to the original cultures. Thus, in the bison area the horse was also used with an enlarged dog travois and in some cases seems to have been so used before the art of riding was acquired. The native names of mysterious-dog, elk-dog, etc., indicate the apperceptive attitude in the northern continent. In South America there was nothing like this, but a unique weapon known as the bola was peculiarly adapted to mounted use. It is believed that this weapon soon entirely displaced the bow and quickly led to the invention of the lasso and its use by all Spanish ranchers north and south. In the bison area the bow was essential for killing buffalo even from horseback. In the Pampas a long lance became the other chief weapon, and though this and the lasso appeared among the Comanche on the southern borders of the bison area, they did not prevail among the other tribes of the North.

The use of the horse spread somewhat from these two continental centers. In the more open parts of the eastern maize area horses were common, but nowhere here except possibly in the Gulf States did they rise to a military level. In the greater part of California they were never used, but in some parts of the inland salmon area they rose to the importance attained in the bison area. The greater part of the caribou area was too cold for the horse.

The military and commercial necessities of Peru were met by caravans of llamas but even then human carriers were in general use. How the large stones found in some of the ruins of that country were transported is not known, but it must have been by human traction alone. Northward from Ecuador to the Colorado River there is no evidence of anything but human carriage. Tribute was brought to Mexico City by brigades of carriers. Chairs and litters for the transportation of people were used throughout the area of intense culture, and to some extent in the Gulf regions of the United States. In all areas there were special appliances for holding the pack upon the back. While only the lightest loads were carried upon the head, in contrast to the African negro way, a widespread method was to support the pack by a strap over the forehead, one form of which is now known as a "tumpline." Perhaps the most unique appliance is the *kia* of the Pima tribes in Arizona.[8] (Fig. 12.)

Before proceeding with our subject we may consider the extent to which animals were domesticated for food. The only place where a pastoral culture was noted is again in Peru. The Spaniards found the llama in great domesticated herds, sometimes reaching the thousands. In addition to their use in transportation, they were slaughtered for their flesh and sheared for their wool. The alpaca was also herded for its superior wool. The use of milk seems to have been unknown here as well as in other parts of the New World. In fact, the Indians as a whole seem to be as deeply prejudiced against milk as the Chinese,[9] for it is with the greatest difficulty that our reservation tribes can be led to care for milk cows. The Spanish Americans seem to have been influenced by this also, for though great ranches were maintained it was seldom that a single animal was milked. This is still shown in our western states where cattle raising was derived from Mexico and gives us a fine illustration of culture diffusion.

Dogs were used as food, but not everywhere. The Spanish colonists found them in general use in Mexico, and in the West Indies the first discoverers found a small edible dog. In North America, dog flesh was eaten in parts of the bison area,

Alaska

Arizona

Mexico

Chile

Fig. 12. Various Methods of Using the Tumpline. Mason, 1896. I

chiefly among the Siouan tribes. On the other hand, many tribes, even of the same stock, are as averse to its use as are the whites. Since here the local distribution of the custom is geographical and is associated to some extent with certain ceremonies, its occurrence may be sporadic,[10] for the general tendency north of Mexico is to regard the dog as not proper food.

Turkeys were raised for their feathers and eggs by the Pueblo and Mexican peoples. According to some authorities the latter domesticated geese also. Turkeys were wild in some parts of South America in pre-Columbian times, but seem never to have been tamed. As to the tribes of the lower Mississippi, we cannot be certain for some of them got chickens so early that the first French settlers in Louisiana found them raised everywhere.[11] They also had orchards of European fruits and raised hogs, while many others ran wild. The natives of Cuba, however, are credited with having domestic fowls and with stocking fish ponds when first discovered. The sheep, and to some extent the goat, was introduced into the great maize area and later developed the chief material characteristics of the Navajo tribe. The domestication of the bee for its honey has been noted above.

CANOES AND NAVIGATION

We come now to the second form of transportation and the one which is not in any way associated with the domestication of animals. It is strictly a mechanical affair from which the modern science of navigation has evolved. Somewhat in contrast to the Old World, the New has no great insular regions except that of the West Indies. The other favorable island group is on the Pacific Coast north of the Columbia River. The only other one in ice-free waters is on the lower west coast of South America. In the region of high culture the coast line is very regular and the inland waters very shallow. South America has one great central river system but no lakes. On the other hand, North America has a large river and lake area with many portages. So far as can be seen, boats were in use wherever advantageous, and from this point of view may be

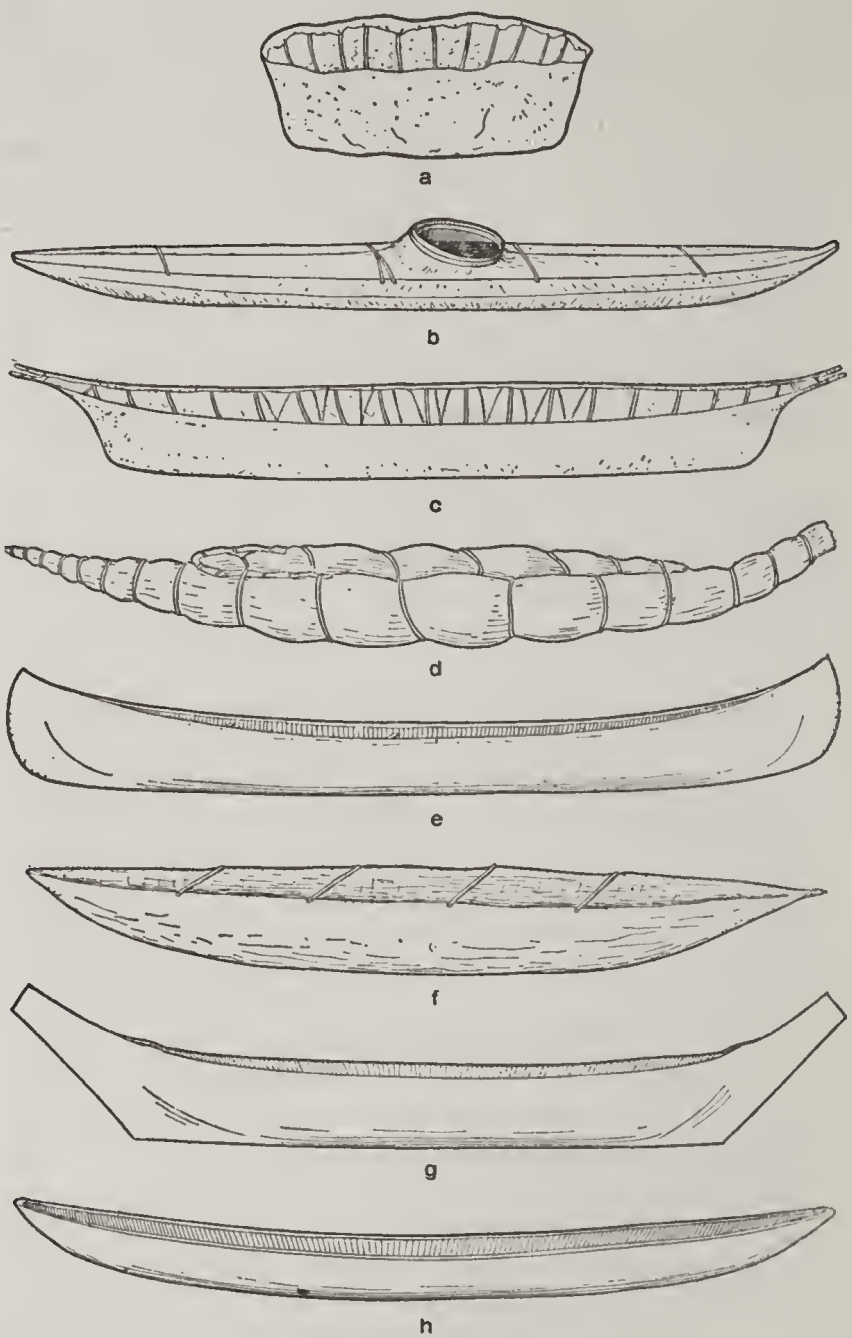

Fig. 13. Types of Canoes Used in the New World. a, *The "Bull Boat," Bison Area;* b, *Eskimo Kayak;* c, *Eskimo Woman's Boat;* d, *Balsa, or Reed Boat;* e, *Birchbark Canoe;* f, *Fuegian Bark Canoe;* g, *North Pacific Coast Dug-Out;* h, *Amazon Dug-Out*

considered universal. Boats were made according to the materials at hand.[12] In regions of large trees the dug-out was preferred, but in the far North, the extreme South and parts of the Amazon country and the lake region of North America, we find frame boats covered with skins or bark. The crudest are the bark boats of the Fuegians; the finest are the birch-bark canoes of the Ojibway and the kayaks of the Eskimo. From Central California to Chile we have occasional occurrences of the balsa type, a raft-like structure of reeds.

If we except the Eskimo, row-locks were not used, the method of propulsion for small boats being to paddle first on one side and then on the other. The double paddle is found only among the Eskimo. (Yet it was reported by Frezier in 1717 as being used in the insular region of Chile with a boat combining some of the features of the balsa and the kayak.[13]) Even the great dug-outs of the North Pacific Coast were propelled by paddles. The use of sails is somewhat in doubt, but it is asserted that the Spaniards found them in Peru with balsas large enough to carry fifty men. Sails are used on the North Pacific Coast, but whether known before the era of Russian trade is not clear. The Eskimo use both the row-lock and sails, but as these occur on the Siberian coast, they are most likely intrusive. From the same source may have come sails on the West coast. Large canoes are mentioned for the West Indies, but no sails are spoken of until later, so that we cannot be sure of their original use there.

The only boat with hull built up of planks was that of the now extinct Santa Barbara of California. Another unique form was the circular tub-like boat with a skin-covered frame, used to ford rivers in the widely separated bison and guanaco areas, and one on the lower Colorado River made of basketry, Spanish name *coritas*.

The two regions in which an approach was made to a seafaring culture were the North Pacific Coast and the Antilles. The great war dug-outs of the former with their carved prows remind one of old Norse models. The latter region was overrun in succession by two races of canoe men, both apparently war-like, the Arawak and the Carib. Of these only the

latter have any just claim to long voyages. In summer, the use of boats by the Eskimo was a prominent feature, especially in Alaska, where voyages of trade to Siberia seem to have been made.

1. Lawson, 1860. I; Mason, 1907. I.
2. Wilson, G. L., 1917. I.
3. Boas, 1888. I; Stefánsson, 1914. I.
4. Maximilian, 1843. I.
5. Stefánsson, 1914. I; Hearne, 1795. I.
6. Wissler, 1910. I.
7. Wissler, 1915. I.
8. Russell, 1908. I.
9. Laufer, 1914. I.
10. Wissler, 1910. I.
11. Swanton, 1911. I.
12. Mason, 1901. I; Friedrici, 1907. I.
13. Frezier, 1717. I, p. 120.

CHAPTER III

THE TEXTILE ARTS

THE subject now before us is far less intelligible to the layman than any of the preceding, chiefly because it deals with definite processes or crafts which must be mastered to be thoroughly understood. This cannot be expected even of professional anthropologists, who must necessarily be guided by the statements of textile experts. With such guidance we may, however, safely proceed to a general view of the subject.

There seem to be but four classes of textile fiber in general use: wool, bast, cotton, and silk. Of these, aboriginal America used all but the last. The sheep was not found here, but the hair of the Rocky Mountain goat was used in western Canada and also that of a dog bred for that purpose. In the bison area, particularly on the lower Mississippi, buffalo hair was spun. Mexico and Central America seem not to have used wool of any kind, no doubt because it was not available. The same may be said of Colombia and parts of Ecuador. As soon, however, as the range of the llama, vicuña and alpaca is reached, their respective wools come into use. Some archæological data indicate that at one time their use extended far down into Chile and out into Argentina.

Of bast fibers we have a respectable list. Even as far north as the caribou area willow bark was used. On the Pacific coast of Canada cedarbark fiber, and inland in the salmon area sagebrush bark were used, extending far down among the Shoshonean tribes of the United States. In California the plants *Iris*, *Asolepias* and *Apocyrum* were used for string twisting. In the bison area practically no bark fiber was used, but about the Great Lakes and eastward, basswood or linn bark was largely employed. Occasionally, cornhusk fiber was utilized. In southeastern United States, particularly on the lower Mississippi, the fibers of Indian hemp and pem-

menaw grass were extensively used. In Arizona and New Mexico we find the maguey, extending down into Peru. In the remaining parts of South America there are a number of bast fibers in use. Thus, we may conclude that the use of bast fibers was general except among the highly specialized hunting peoples of the extreme North and South.

Cotton, though a vegetable fiber, is a wool rather than a bast. Fiber experts claim that it is only the cultivated varieties that can be successfully spun. Proceeding from north to south we first encounter cotton in the Pueblo area of the United States. That it was grown in what is now the great cotton belt of the United States is improbable, but from the Pueblo country down through Mexico to Peru, cotton was the great textile fiber. The known varieties were white and brown. In other parts of South America and the Antilles a little cotton was grown, chiefly to be used in making hammocks.

Taking a general view of the preceding facts, we note that the distribution of cotton culture is in the main coincident with the regions of higher culture; at least, it is not found among non-agricultural peoples. Wool fibers appear in three disconnected regions: around Peru, British Columbia, and the lower Mississippi. Bast fiber, on the other hand, is practically universal, but shows decided specialization in the several food areas.

One other class of fiber not generally recognized by us is sinew, or tendon. Among the Eskimo and the Indians of Canada it is of the greatest importance and also holds a high place in the bison area, the salmon area, and the northern part of the eastern maize area. In fact, when skin clothing is made, we find it in use, even in the guanaco area of South America.

SPINNING

The twisting of fiber into thread is the pre-requisite of the whole textile art. Its distribution over the world is as universal as the use of fire and its origin probably fully as remote. Though there is but one way to do it, twist the fibers one upon the other, the appliances vary considerably. The primitive way, and no doubt the first historically, is solely by hand.

A more mechanical way is to give the twist by a spindle bearing a whorl.

Our first problem is to distinguish the different methods of spinning and state their respective distributions. In this we must proceed with hesitancy because of inadequate data, but since very little native spinning survives there is no ground for expecting important additions to our field observations. The subject is, therefore, ready for such comparative study as can be made. We have neither the time nor the special knowledge to do this now, but will discuss the most obvious points.

One of the most direct approaches is the distribution of the spindle whorl. Its known occurrence in North America is in the highlands from Panama to the Colorado River. Then with a break in continuity we find it in British Columbia and on the adjoining coast. The only other place where there is even a suspicion of its use is the lower Mississippi. This conjecture is based upon the bare mention of an improvised affair, a wad of clay upon a stick, by an early writer.[1]

Archæological data are on the whole consistent with the foregoing facts, from which their general finality may be assumed. Pre-Columbian sites yielding undoubted spindle whorls must be our safest criteria, because we lack definite knowledge as to the exact state of spinning before white contact, and it is conceivable that the use of the European whorl could have been introduced quickly, as we have already noted in case of the horse. Peru presents a puzzling case, for notwithstanding the high development of the art, the early historical data indicate the absence of a true whorl,[2] and objects of this nature are seldom found in excavating. However, in the northern part of the Andean region, pottery objects resembling whorls are frequent. In other parts of South America they are rare, but the modern natives use them. If we try to correlate the distribution of the whorl with that for fibers, we note that it is wanting in the distinctively bast and sinew areas. Where cotton, wool or both together are spun, we find the whorl, unless Peru should prove to be an exception.

Outside of the whorl area we have defined, bast and sinew thread are given the final twist by rolling under the palm of

the hand, usually upon the bare thigh or calf of the leg. (The peculiar slit skirt of the Algonkin and Iroquois is regarded as a hand spinner's costume by Parker.[3]) A twisting appliance has, however, been noted for the Eskimo.[4]

But to return to our subject. The methods of preparing fibers for spinning differ with the materials, but after they are separated and cleaned, all must be carded, or extended

Fig. 14. Ancient Mexican and Egyptian Drawings of Spinners. The first shows the prevailing New World method. There is some doubt as to what part of the process is represented in the Egyptian figure, but the draft, or tension, is supplied according to the Old World method

in the same direction. No aboriginal appliance for this has come to light, but with the introduction of the sheep, the European card was also introduced and has been in use ever since. The difference between hand and whorl-twisting is merely a matter of machinery. In either case, the native first arranges the roving by hand. The only twisting machine in use for true textile fibers was the whorled or rolled spindle, but there was nothing like the wheel of the Old World. Further, we are told that it is only bast fiber that can be twisted by rolling under the palm upon the thigh. Neither cotton nor wool can be economically handled that way because of

Fig. 15. A Navajo Spinner

the shortness and other characteristics of the fiber. In this case, the fiber must be made into a roving and then twisted from each end under the necessary draft, or tension. Thus, in the New World, we find that wherever cotton or wool are spun, a stick or spindle is used to facilitate the twist and to wind the finished thread. In Europe, spinning was by the whorl and distaff method; the spindle, being provided with a whorl or fly-wheel, was twirled and dropped, its weight providing the draft, and the momentum of the whorl the twist. There is yet no reason to believe that this method was practised in the New World before its discovery, the draft here being given by a pull of the hands, the spindle resting in a bowl on the ground, or simply held in the hands. The New World whorl is, therefore, not a true whorl, and was often dispensed with, as seems to have been the case in parts of Peru.

The uniformity of the aboriginal method of spinning cotton is clear when we compare such studies as Roth's[5] for the less cultured peoples of South America with the processes used in Old Peru. On this account we are scarcely left any other alternative than to conclude that the cotton complex of the entire New World is essentially one, as is the maize complex (p. 28), and that it was likewise diffused from a single center. Just what may be the relation between the wool and cotton complexes is not clear, for we have the salmon area peoples spinning wool and not cotton, and again the buffalo-hair spinning of the Mississippi Valley. As to how the latter was spun, we have no precise data, but in the salmon area a form of the characteristic New World spindle method was used.[6] Cotton could not be raised there, obviously.

NETTING

The making of string readily suggests nets, a form of textile almost as world-wide as fiber twisting. Accompanying the art are two implements: the shuttle and the mesh gauge. Unfortunately, no careful study of the net technique and the distribution of the implements is available, but one who reads Rau's searching paper on modes of fishing [7] will see at a glance the importance of the problem. First, the manner of tying

the meshes of the net is very much the same everywhere. This may be because the trait is as old and fundamental as the firedrill or merely due to the fact that there is but one good way by which a net can be formed. In the absence of investigation, speculation on this point is useless, yet we seem to have here an unusually promising subject for weighing the relative merits of the independent origin and diffusion theories of culture.

In the New World, fish nets seem to have been in use, wherever possible, from Cape Horn to Alaska and their antiquity is vouched for by the excavation of notched pebbles used as sinkers. Stefánsson,[8] however, secured archæological data from the northernmost coast of Alaska and western Canada, indicating that nets were of relatively recent introduction among the Eskimo of those districts. In view of the data supporting their antiquity elsewhere and their present universal distribution, this appears as a localized exception.

The netting shuttle and mesh gauge are found chiefly in North America where they have a continuous distribution with Siberia and adjacent parts of the Old World. The precise forms of eastern Siberia are found in Alaska, but as we move southward along the coast toward California, the forms show more variation, as also eastward over the Great Lake area. So far, such implements have not been reported from South America, where nets are frequently made of cotton and woven upon a frame, as is the case with hammocks. The most recent contribution to the subject is Moore's theory that the so-called bannerstone found east of the Mississippi is a mesh gauge.[9]

The closely allied techniques of lace making and tatting are found in many parts of the great cotton-using area, but have not been studied in detail.

BASKETRY

It is doubtful if any people exist who do not understand the art of intertwining twigs or other elements; likewise most of them show some conception of basketry. Even such an extreme marginal group as the Tasmanians made some progress

with it, and in the New World it is difficult to find groups of tribes entirely innocent of the art. About the only localities without basketry are among the eastern Eskimo, and parts of

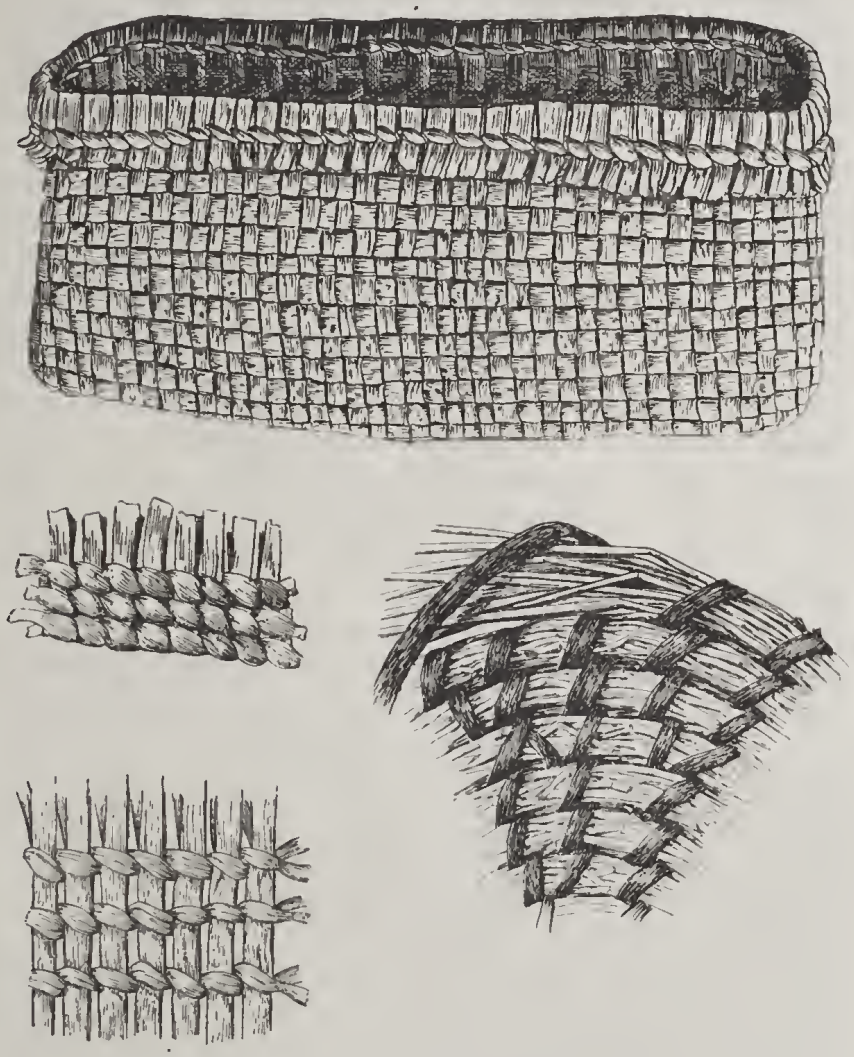

Fig. 16. Basketry: Straight Weave; Close and Open Twine; and Coil

the bison and guanaco areas, all specialists in skin work.

The subject has received a great deal of attention and that great master of material culture, O. T. Mason, has left us an excellent treatise.[10] Our museums have extensive collections,

while those of private students are equally rich; there is also an abundant literature. Notwithstanding all this, the subject presents many unsolved problems.

Baskets can be readily classified as woven or coiled (sewed). The basic concepts for these different classes seem to have nothing in common, from which it is fair to assume that they have separate histories. Under these heads many techniques may be distinguished.[11]

From our point of view, coiled basketry reaches its highest development in California, where the Pomo are generally given the first rank. Aesthetically considered, these baskets are probably the finest in the whole world. From this center, coiling extends to the interior highlands among the Shoshoni-speaking tribes, thence northward through the inland salmon area and the Déné portion of Canada. Even the Eskimo of Alaska use it, and also the natives of eastern Siberia. To the east, it stops in the plains, but extends southward among the Pima, Navajo, Apache, and other non-pueblo-dwelling tribes. Of the Pueblo peoples only one section of the Hopi uses the process and elsewhere there are but the crudest of attempts. In Mexico the technique disappears and does not come to notice again until we reach Patagonia. While in California a few of the coast tribes were coilers, the main distribution is inland, for beginning with the upper part of California, the entire coast belt including the Aleutian chain is exclusively devoted to woven basketry. In the eastern part of North America coiling is rare, a few of the northern Algonkin tribes following the lead of their Déné neighbors.

Notwithstanding the high development in the coil area, it is itself a part of the great western twined area. (Twine is a form of woven basketry.) The Pomo, for example, also make fine baskets of this weave, which can be said of most coil workers. In other words, coiled basketry seems to be a smaller area overlying a larger one of twined basketry. The Pueblo peoples do not make it, but do produce a kind of wickerwork like the tribes of northern Mexico, while their non-Pueblo neighbors, the Apache, Walapai, etc., make twined as well as coiled baskets.

Fig. 17. General Distribution of Types of Basketry

Almost all of the twine and coil basket weavers are stone boilers, that is, they cook in baskets by dropping hot stones into their contents. Close fine twining and coiling is thus a necessity, for cooking baskets must be water-tight. In the pottery region of the Pueblos and southward, basketry is open and coarser. This undoubtedly accounts for the very high development of the art in California and northward.

Returning to the concentric distribution of the coil and twine technique, one must wonder which is the older. Some of the Déné coiled globular baskets are almost identical with a Chinese style, but this is more likely due to similar materials, for the intervening Siberian styles are more like those of the Eskimo. Thus coil seems to center in California and twine on the coast of the north, thus indicating their most probable centers of dispersion. We must, however, allow for more complex conditions, since archæological remains in certain cliff-houses indicate a high development of coil in prehistoric times. The studies of Kroeber[12] and Barrett,[13] as to the direction of the spiral coil in making the basket, suggest that central California and Arizona are of one type, while southern California (the Shoshoni-speaking tribes) and the interior as well as on northward, are of another. The meaning of this is not quite clear, but can be most readily explained as due to differentiation from two centers of influence. Hence, the chronological relation of coil and twine basketry remains a problem for the future.

The central portion of the bison area marks a hiatus between the basketry of the east and the west. Down the Mississippi and south from the Great Lakes, across the Antilles and on into the manioc or Amazon area of South America, basketry has one common characteristic in that it is made of flat or splint-like materials. Basketry of this sort is also found in the Andean region, but seems not to have been the prevailing style. The material is usually cane, which is probably responsible for the observed distribution. North of the Ohio River and in New England where suitable cane was not to be had, we find wood splints in use. These are made from the easily separated annual layers of certain trees. It seems a reason-

able assumption that a historical connection exists between those two forms, and since basketry of cane is very widely distributed and the materials more readily prepared, we may suspect this to be the parent form.

In this connection birchbark vessels may be noted. They are an associate of the birchbark canoe from Nova Scotia to northern Russia.[14] At no place in America, however, do they entirely displace woven or coil techniques.

Though closely analogous to splint basketry, matting does not always accompany it. Yet there are few peoples outside of the great hunting areas who do not use mats in some form. In the main we have two kinds: those woven of flat flexible materials, and those made by binding together long reeds or even twigs.

CLOTH

We can make one clear distinction between basketry and cloth, for the latter is formed by the weaving of spun or twisted materials. It is therefore made of string, or yarn. We have noted that some knowledge of thread-making is universal among mankind, but it is otherwise with the weaving of cloth. Such weaving in the New World may be comprehended under two designations: loom weaving and finger weaving, or upward weaving and downward weaving. In the loom, the weaver begins at the bottom and builds the fabric upward, driving the weft home with a downward stroke; in the other, the warp threads are hung loosely from a horizontal support and the fabric built from the top, the weft being pushed upward into place. In loom weaving, a sword or batten is used to beat down the weft and also as a shedding device, though an additional shedding device may be used. In downward weaving there are neither battens nor shedding devices, the fingers taking their place, though a bodkin or other pointed instrument may be used to force the weft into position.

Loom weaving begins with the Pueblo peoples and extends southward over the entire area of intense maize culture. Finger weaving is found in the salmon area, the Chilkat

blanket[15] being the most unique example, and covers the entire eastern maize area. The data for the Antilles are meager, but since the natives there made some use of cotton, it is safe

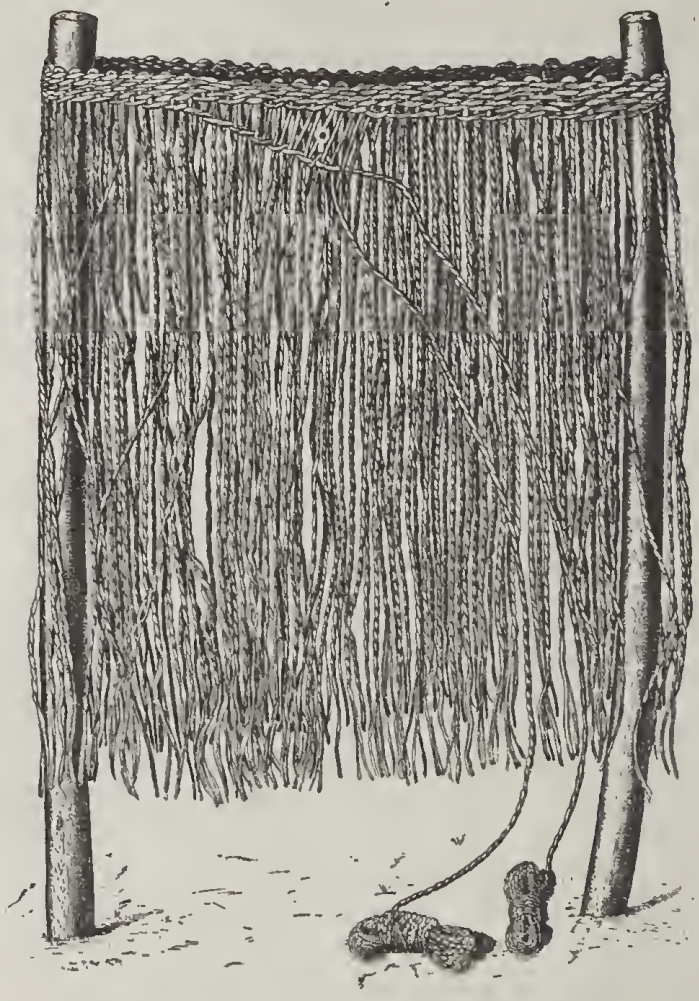

Fig. 18. Ojibway Weaving Frame, Showing the Suspended Warp and Method of Twining in the Weft. Weaving Proceeds Downward. See Fig. 70

to assume a loom. In South America the entire manioc area seems to have been influenced by the Andean region in that looms of some kind were in use. Cotton was raised in many parts for making hammocks, which were woven on a kind of loom.[16] In fact, the loom is a correlated part of the spindle-

Fig. 19. A Navajo Weaver
A typical New World loom. The weaving proceeds upward
Goddard, 1913. I

Fig. 20. Distribution of Weaving

spinning complex, which we have closely associated with cotton. The chances are, therefore, that this whole loom complex spread as a unit.

The distribution of downward weaving will repay further study. Thus in the Aleutian Islands flexible baskets are woven suspended, and the Ojibway and other Central Algonkin tribes wove flexible wallets and soft bags in the same way. This, with the Chilkat blanket, gives us a broad sweep across the continent. In the main, too, this region is also the area of spinning without a spindle.

Turning aside for a moment, we find a peculiar type of sagebrush bark weaving in the plateaus among the Shoshoni and Salish in which parallel twisted strands are joined by widely separated rows of twined thread in pairs.[17] Among the Kwakiutl and neighboring tribes, cedarbark is used in the same way. A similar technique for bags and mats is found around the Great Lakes and eastward. A few specimens from the Salish suggest that wild goat wool was sometimes treated in a similar fashion.

It appears, then, that north of the area of intense maize culture we have in general a basketry-like basis for weaving, and that when weaving is attempted with twisted elements, it is with suspended warp as for baskets and mats. Consistent with this is the rarity of the spindle.

Our problem is not simple, however, because among the modern Salish we find a frame for weaving coarse wool blankets.[18] This may have been introduced by whites, but as the batten and shedding devices are absent and the weave is downward, we still have one of the weaving characteristics of the area. Very widely spread is the weaving of blankets from twisted strips of rabbit fur, a method which has a continuous distribution from Yucatan northward in Mexico and thence over the great plateau area of the United States to Canada where it traverses about the whole of the caribou area and reaches far down into the eastern maize area. This blanket is usually woven on a frame, but also without a batten or shedding device. The similarities between the Salish goat wool blanket and the rabbitskin blanket are so striking that

one must suspect some reactionary influence. Returning to our subject, it is clear that the loom and upward weaving is a development of the South, presumably the area of intense maize culture, and that from there it was diffused around the north coast of South America and down the east side. Also the spindle method of spinning is definitely associated with the loom, though in one instance its distribution is wider.

Fig. 21. Cape of Sagebrush Bark, Showing a Simple Open Weave. Teit, 1900. I

Space forbids going into details as to the quality of the product. From early accounts it appears that there was a remarkably high development in the Andean region. It seems that at the time of the Spanish Conquest the textile art was the chief social interest and that the whole governmental machinery was directed toward the encouragement of its production. Thus taxes, fines and tributes were levied in fine cloth. As to the qualities, we have not only the testimony of early observers, but in the desert burial grounds of Peru we have immense storehouses of prehistoric cloth preserved completely in the original forms and colors. Recent studies of

museum collections by a textile expert [19] have shown that the fineness of weave exceeds that of any other known part of the world. As to forms of weave, we find the same techniques as in the Old World, even to the pile and gauze. Outside of America, the known weaves can mostly be traced to southern Asia; hence, it is peculiar that we should find two disconnected world centers of textiles and that each should develop the same techniques. As to the weaves and qualities of Mexico and Central America, we are far less certain, since nature has not preserved samples for us, but from historical statements we infer that they also were of a high order. In southwestern United States we have an environment analogous to that of Peru, but which has less perfectly preserved examples of cliff-house textiles. This, however, is the extreme margin of the area where, consequently, we cannot expect very high development. Our museums contain a few specimens, but they have not been studied by a textile expert. The surviving Pueblos of Arizona and New Mexico and the Navajo still weave, but to what extent they have been influenced by white contact we are not certain. For a long time they have used the wool of the domestic sheep almost exclusively, and though their work is highly prized by collectors, it is very coarse when compared with Peruvian types. Of the cotton cloth in the manioc area we have very little data. The early accounts of the southern half of the eastern maize area indicate a fair degree of textile development.[20] While the information available is not specific, the statements of early observers lead us to suspect that tapestry and double cloth were known, and that while the typical suspended, or downward, weaving was used, some tribes used a true loom, the two-barred loom, and a loom with three cross rods for twilling buffalo-hair cord. Woven feather-work was common, and there is mention of painted cloth. Perhaps the most distinctive textile of this area was buffalo-hair weaving, this art extending far up into the Mississippi Valley.[21] The Chilkat blanket of the North Pacific Coast is quite coarse in weave, though somewhat finer than the fabrics of the immediate interior. The remainder

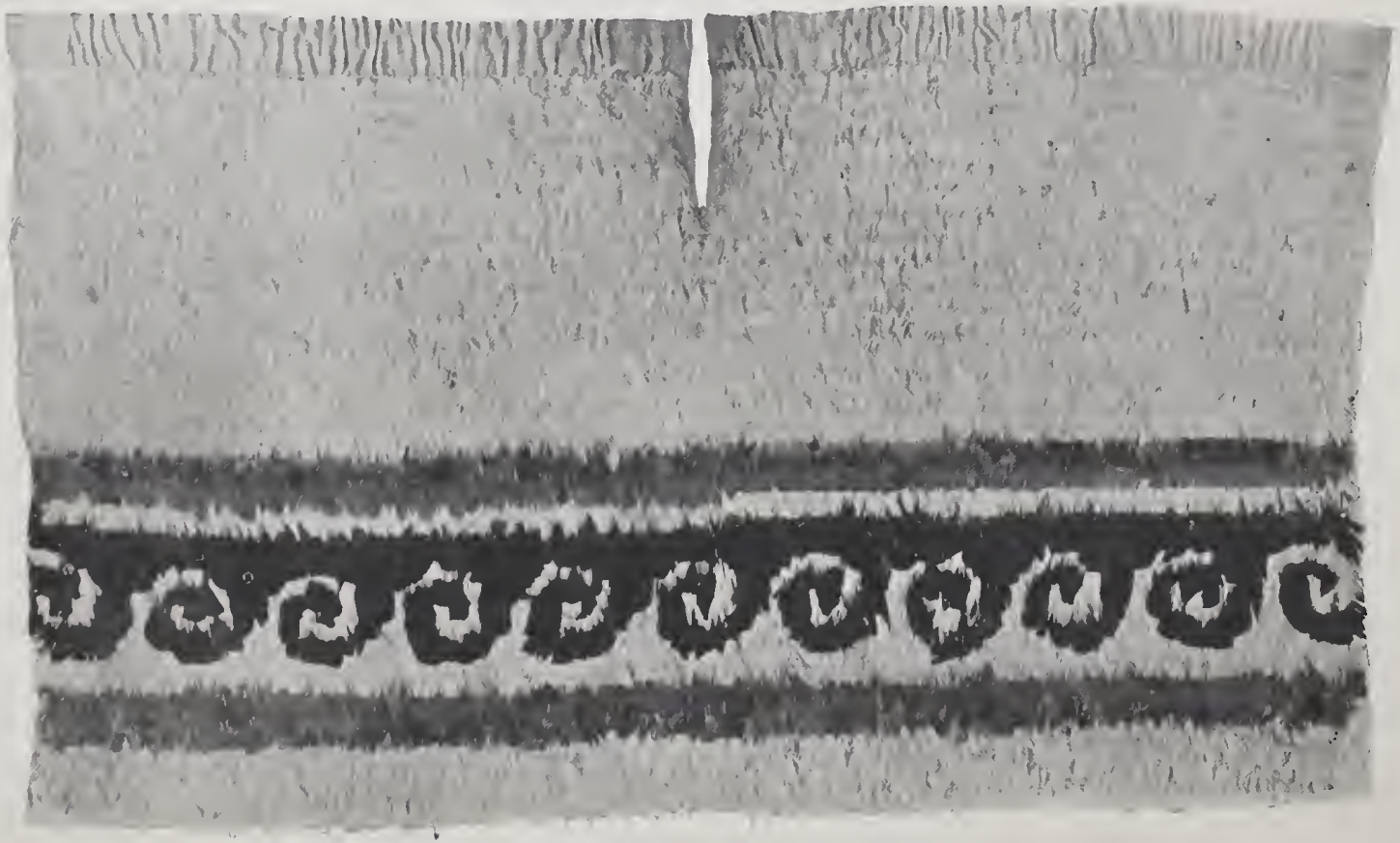

Fig. 22. Peruvian Feather Poncho, Prehistoric

of the continent, however, cannot boast anything that rises to the true cloth standard.

FEATHER-WORK

This seems a convenient place to note one of the most characteristic developments of New World technique, *viz.*, feather-work. The center of the art seems to have been in Mexico, where highly decorative schemes were carried out by overlaying cloth with feathers. A few specimens have been preserved for us, but our real insight into this trait-complex is from historical accounts, particularly Sahagun. Cloaks and mantles for distinguished persons, headdresses for war leaders, and other badges of distinction were in feather mosaics.[22] The less distinguished persons sometimes wore mantles of turkey feathers, an art extending to the Pueblo tribes of the United States, thence eastward through the Gulf States and northward as far as the Hudson River. On the Pacific Coast feather mosaics reach a high state of development in California basketry. Feather insignia and headdresses were conspicuous among some of the warlike tribes of the bison area.

Turning southward from Mexico, we find a fair development of feather mosaics in Peru;[23] then out into the Amazon country where true mosaic work is rare we find one of the most characteristic traits to be brilliant feather-head decorations. Thus, taking Mexico as the center, we see a radiation of feather-work into both continents. We may also be reminded of the very striking parallel in Hawaii and the possibility of an historical connection between the two.

CLOTHING

To describe the different styles of clothing for the various groups of natives is impossible in a few pages, but some of the general characteristics may be noted. The most completely clothed are the Eskimo and the caribou hunters of Canada. These people cut out and fit pieces of prepared skin together somewhat like a modern tailor. Moreover, their patterns are equally intricate and their skill in fitting gives distinct local styles. The southern limits of tailored skin

Fig. 23. General Types of Costume and Their Distribution

garments are practically those of the caribou area, but in modified form they extend down into the most nomadic part of the bison area. Also, in some of the inland districts of the salmon area variants appear. The whole Pacific Coast plain from the Tlingit of Alaska to Lower California was occupied by bare-footed, scantily clothed peoples, among whom the true coat and trousers were unknown. In the southern part of the eastern maize area, the costume consisted of little more than a breech or loin cloth. When needed, a robe or kind of loosely fitted cape was put on. Notwithstanding its ill adaptation to winter climate, this form of costume extended into New England, where, while leggings and moccasins protected the feet, the trunk was covered by a robe so arranged as to leave one arm free. This was covered by a muff-like sleeve.[24] In the bison area, as far north as Dakota, where the winters are severe, the bison robe was the only upper garment. It is quite clear, therefore, that tailored skin clothing is an associate of the caribou or reindeer area, and that the only definite intrusion it makes is in the western part of the bison area and the contiguous parts of the salmon area.

In the great weaving area of Mexico and the Andes, clothing is of woven cloth. The peculiarity of such clothing is that it was never cut and fitted, but each garment was worn in the form in which it came from the loom. Thus a poncho, or shirt, is rectangular, with one slit for the neck and two for the arms. In some cases very short sleeves were added, formed by folding a rectangular piece of cloth and sewing. Thus, in the textile area we find the tailor's art at its lowest. That this is not entirely a matter of environment is suggested by the weakness of tailoring among the skin-wearing tribes of Patagonia, who do little more than muffle themselves in a robe. Originally this robe was worn over one shoulder like the Algonkins of the Atlantic plain.

When we look to the Old World we find a similar distribution. In Siberia and northern Europe, we have tailoring of reindeer skins. Across southern Asia and around the Mediterranean is the great historical textile area from which all our own fine textiles seem to have been derived. As we pro-

Fig. 24. Forms of Footwear

ceed southward into Africa and Australia we meet with peoples who wear skins, but who do not cut them into garments. While there is a climatic factor here, there are still other influences to be considered. Europeans and their New World offspring are the only peoples except the Chinese who specialize in the cutting and fitting of cloth. History shows that tailored garments came into Europe relatively late, whereas in China they seem to be very ancient. Now the Chinese and Europeans were in contact with the reindeer hunters of the North and when we have such continuity for the distribution of a trait we usually consider it a case of diffusion from one center.[25] The continuity of the trait in Siberia and America is also clear. We see, then, that the whole tailoring art of the world has a continuous geographical distribution and centers around skin garments rather than those of cloth.

It has been noted that certain peculiar styles of garment in the bison area were due to the natural form of the skins.[26] This seems to be the natural consequence with a people who, lacking tailoring traditions, worked out a more complete costume of skins. We have noted that in the case of textiles the rectangular form necessitated by the technique of loom weaving, together with the lack of the tailoring idea, gave a characteristic form to the woven garments. In the bison area we find a skin poncho which follows so closely the main form of the textile poncho to the south that it is difficult to deny a historical relation, though, as stated above, the similarity is disguised by the peculiar contour of the edges of the skin.

There are many other interesting problems in costume, but we have no space for their discussion. For example, a study of footgear is highly suggestive. Thus we find in both the Old and New World that the sandal is a correlative of textile clothing. In the bison area, moccasins have hard soles in contrast to those of the forest regions, which, considering the geographical relations, suggests the intrusion of the sandal idea, though denied by Hatt.[27] Going barefoot is peculiarly prevalent on the west coast of the salmon area and is the rule in the southern half of the eastern maize area and thence

through the Antilles and down the eastern side of the Andes. In Patagonia a skin shoe again appears, but the Fuegians tend to go barefoot.

1. Adair, 1775. I.
2. Crawford, 1915. I.
3. Parker, cited by Wissler, 1915. II.
4. Nelson, E. W., 1899. I.
5. Roth, 1910. I.
6. Kissell, 1916. II.
7. Rau, 1884. I.
8. Stefánsson, 1914. I.
9. Moore, 1916. I.
10. Mason, 1904. I.
11. Kissell, 1916. I.
12. Kroeber, 1908. I.
13. Barrett, 1908. I.
14. Boas in Teit, 1909. I.
15. Emmons, 1907. I.
16. Im Thurn, 1883. I.
17. Teit, 1900. I.
18. Teit, 1909. I.
19. Crawford, 1915. I; 1916. I.
20. Du Pratz, 1758. I; Lewis, T. H., (Editor), 1907. I; Hunter, 1823. I; Adair, 1775. I; Kalm, 1772. I.
21. Bushnell, 1909. I.
22. Seler, 1904. I.
23. Mead, 1907. I.
24. Willoughby, 1905. I.
25. Hatt, 1916. I.
26. Wissler, 1915. II.
27. Hatt, 1916. I.

American Museum of Natural History Photograph

Fig. 25. A Pueblo Indian Potter

CHAPTER IV

THE CERAMIC ARTS

THE first point to demand our attention is the distribution of pottery in general. As nearly as can be told, at the time of discovery, North America had but one large area in which no pottery was made. If we draw a line from Ottawa to the mouth of the St. Lawrence and another to Edmonton, and then one from Edmonton to Los Angeles, we shall have, in the rough, the northern boundary to pottery making. There seems to have been a narrow strip down into the bison area that should be excepted. This extended down through the country of the Arapaho, Cheyenne, Kiowa, and Comanche. On the other hand, certain early information for the Ojibway, Cree, and Blackfoot westward from Winnipeg, indicates that they made pottery; but this about exhausts the exceptions. Practically the whole of the Pacific belt and the great sweep of the caribou area is without pottery, but the Eskimo of Alaska and eastward at least as far as Coronation Gulf made it. Archæological evidence does not change the boundary; hence, we may infer that the distribution of pottery was still in progress at the opening of the period of discovery and that it was distributed from the South. In Siberia we find a pottery somewhat like that of the Eskimo, which suggests that in this case the trait is intrusive from Asia. Yet, we must not overlook the possibility of contact with North American potters around Hudson Bay, a region whose archæology is absolutely unknown. The improbability of this arises from the absence of the trait from the greater part of the caribou-hunting peoples, its tendency to fail the most typical bison hunters, and that its encroachment in each case resembles the fringe of an adjoining area. We see that its extension out into Saskatchewan and Alberta is coincident with the distribution of Algonkian-speaking tribes: the Blackfoot, Cree, and Ojibway.

Fig. 26. Distribution of Pottery

In the bison area the encroachments are chiefly among the Siouan-speaking tribes. Then, if we recall the limits of maize culture, we note a rather close agreement between the distributions for the two traits. As we know that maize came up from the South, it is reasonable to suppose that pottery came by the same road. As to their time relations, we cannot be so sure, for though pottery has gone a little farther than maize culture, there is a climatic limit to the latter.

Over the Antilles, through Mexico, and on into South America was the great pottery region. In some places archæologists have uncovered deposits of sherds many feet thick, suggesting an intensive pursuit of the art similar to that for textiles (p. 59). Outside of the Andean area pottery is less intense. It has been reported from sections of the manioc area throughout, from which we may infer that its distribution there is approximately continuous. In the South, somewhere near the 30° of latitude, it disappears altogether, so that about the only part of the southern continent that did not make some pretense of pottery was lower Patagonia and a portion of the Brazilian highlands.

PROCESSES OF MANUFACTURE

The process of manufacture varied according to locality, but one general characteristic applies to all, no wheel was used in the New World. It is true that large vessels were often built up on shallow baskets and turned slowly to bring the successive parts within easy reach, but this does not involve the principle of the wheel. Even the Lacandone (Guatemala) method of supporting the pot upon a block which is turned by the feet, is not a true wheel, for the turning is merely for the sake of bringing all parts of the surface to the potter's hand.[1]

As a rule, all the New World potters used the coil method; *i.e.*, slender rods of clay were rolled out to convenient lengths and the vessel built up spirally. In some vessels from the Pueblo area the original traces of the coils were retained as decorative motives, but as a rule, the surfaces were afterwards scraped smooth and to the requisite thinness. So far as we have data, the coil method was used in all of the Amazon

area of South America and in southwestern and eastern United States, except in the general area about the Great Lakes. In this northern section, we have the Mandan-Hidatsa type, fully described by G. L. Wilson,[2] in which the vessel is worked

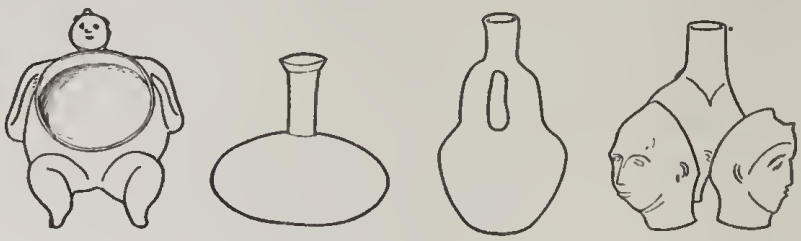

Fig. 27. Lower Mississippi Pottery. Holmes, 1903. I

out from a single block of clay, then beaten into shape with a paddle, fired, rubbed with grease, and coated with a solution of boiled maize. Less complete, but still adequate, data from the Blackfoot, Menomini, and Pawnee indicate that in the upper Mississippi area we had a generalized type of this process in contrast to the coil method. Eastward in the northern Algonkin area our data are not so good, but it is generally believed that the coil process prevailed, except in the farthest north where the pottery was very crude.

This upper Mississippi, or Mandan-Hidatsa type has a striking resemblance to Alaska-Siberian pottery. The studies of Jochelson and Bogoras[3] show one general method for Alaska and eastern Siberia, a method closely paralleling the

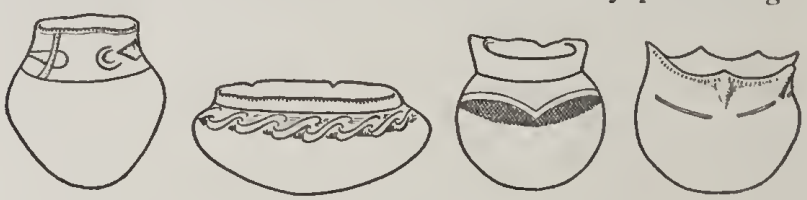

Fig. 28. South Atlantic Pottery. Holmes, 1903. I

Mandan-Hidatsa type. The Blackfoot, Menomini, Cree, and some of the adjacent tribes fired their pots by putting them over the fire, as in use, after first soaking them with fat. This is also the usual method among the Chukchee and Alaskan Eskimo. The archæological specimens collected by Stefánsson

at Cape Parry also show this crude firing. We thus have two regions of similar pottery traits, which as previously stated, may, after all, be connected west of Hudson Bay.

In Mexico, Central America, and the Andean region the coil method seems to have been in use, but as to its relative position we cannot be sure. Traces of molding are seen in prehistoric pottery from Central America and Peru, where the potter's art ceased to be mere woman's work and rose to the level of a profession. On *a priori* grounds the coil method

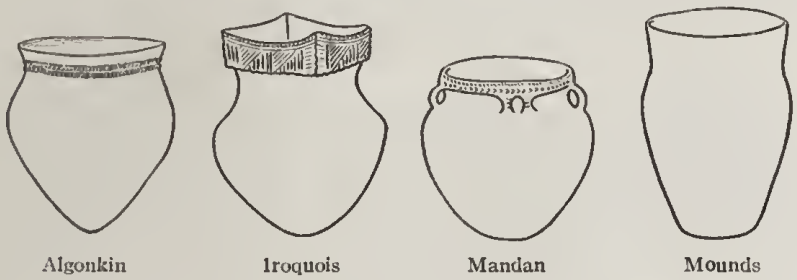

Fig. 29. North Atlantic and Upper Mississippi Pottery. Holmes, 1903. I

seems ill adapted to the fine modeling found here, yet it is clear that it is the fundamental method throughout the greater part of the pottery area. That it is the most primitive way may be doubted, since we find the crude pottery of the upper Mississippi and the trans-Bering region simply worked out from a mass. Such questions, however, must await chronological studies of the ceramic art.

The methods of tempering clay with sand, gravel, pulverized stone, or shell, used in the New World, are not essentially different from those employed in the Old. The use of "slips," or thin washes of such clays as will give pleasing color tones was understood in most places, the exceptions being the southern coast of Brazil and Patagonia, the greater part of eastern United States, the upper Mississippi, and Alaska. In short, the use of "slips" is found wherever pottery rises above the mere utilitarian level.

The principle of glaze, highly characteristic of later Old World pottery, was not understood in the New. Yet, in the Pueblo area, a true glaze was used for decoration, giving us

what is known as the glazed type.[4] Since this glaze does not cover the entire surface, its use could not have been to make vessels water-tight. Glazed ware has also been reported from Totonac sites near Vera Cruz and also from the vicinity of Coban, Guatemala.

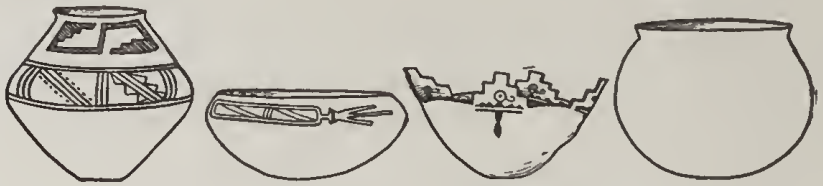

Fig. 30. Pottery from Southwestern United States

However, when we turn to pottery paints the New World takes high rank. A brief visit to a museum will make this point clear. The only place where aboriginal pottery of the higher type survived the Conquest is in southwestern United States, and it is from here that most of our knowledge of processes comes. Here we find the paints of both vegetable and mineral origin, the reds and yellows from iron, the blacks from juices of plants. By proper firing, the desired colors could be made permanent. On the whole, aboriginal clay work was almost exclusively limited to ornamental and useful

Fig. 31. Mexican Pottery

vessels, though in a few localities in the United States the stone pipe gave way to one of clay and in certain parts of Mexico true bricks were made.

POTTERY FORMS

Our consideration of pottery forms may properly begin with the United States.[5] On the whole, wherever pottery is extensively manufactured, there is considerable variety of form,

but still the preference is given to two or three forms which may be taken as the distinguishing characteristics of the several areas. For example, in the lower Mississippi Valley the most distinctive forms are the bottle-like vases and effigy bowls. Among the latter are some remarkable human heads.[6]

In the South Atlantic region, the bowl is the prevailing form and one type approaches the olla of the Southwest. In the North Atlantic area is the well-known pointed-bottomed jar of the Algonkin, and inland the highly original Iroquois square-topped pot. Finally, in the upper Mississippi, we find

Fig. 32. Central American Pottery. MacCurdy, 1911. I

a simple, globular, narrow-rimmed pot. The greatest variety of form is in the lower Mississippi area, where ceramics rises to the level of a true art.

Proceeding southward, the next great pottery area is southwestern United States, where the leading forms are the shallow bowl and the bulging olla.

Notwithstanding the great complexity of ceramic culture in Mexico and Central America, there is at least one characteristic form throughout, *viz.*, a support of three long legs. There is also a tendency toward flat bottoms and cylindrical bodies in vessels not supported by legs.

In Colombia and Ecuador, hourglass shapes abound, while in Peru, we find the pointed jar, the double jar of which "whistling jars" are an example, and the effigy vase, the latter reminding one of the lower Mississippi group. In southern and eastern Brazil, the most distinctive shape is the bulging burial urn, in some cases with a hood. Frequently, these urns take an hourglass form which is also the leading form for household pottery north of the Amazon. In addition, through-

out the whole of the Amazon pottery area we find an extraordinarily large tub-shaped vessel, and in eastern Brazil a local development of effigy jars quite parallel to that of the lower Mississippi.[7]

An interesting theoretical problem lies in these pottery

Fig. 33. Peruvian Pottery

forms. It appears that almost everywhere the cooking pot tends toward the oval or hemispherical form and that the regional distinctions we have drawn are in vessels for other purposes, often largely ornamental. Thus, when we move northward from the lower Mississippi, pottery becomes strictly a vessel for cooking, or specifically utilitarian. In the North Atlantic area, pottery has a rival in soapstone, but vessels of this material have a form of their own which seems to have

Fig. 34. Pottery Forms from Eastern South America. Joyce, 1912. I.; Von den Steinen, 1897. I.; Im Thurn, 1883. I

something in common with the cooking kettle of the eastern Eskimo. Some pottery vessels collected by Stefánsson and Anderson between Hudson Bay and the Mackenzie River have corners quite like Eskimo soapstone kettles, but the better type of Alaskan ware has a shape like that common in

Aleutian baskets; yet, if there is a fundamental ceramic container concept in the New World, it is that of the globular cooking pot. The strong claims for the recognition of this form appear when we examine the animal-like vessels of Central America and the lower Mississippi in which we usually see the globular part with ornamental appendages.

POTTERY DECORATION

Decorations of pottery fall into two groups, those produced by secondary modeling, and true designs. The former is a prominent feature in Peru, Colombia, Central America, the lower Mississippi, and eastern Brazil. Elsewhere it is relatively infrequent, the preference being given to painted or incised designs. The secondary modeling of the so-called Chiriqui pottery from Panama has been carefully studied by MacCurdy [8] who finds that practically all consists of efforts to represent the armadillo and the alligator. Von den Steinen has given an illuminating discussion of animal forms in eastern Brazil, in some cases so reduced by conventionalization as to appear symbolic.[9] A somewhat similar study has been made of lower Mississippi pottery,[10] but without the help of the makers, the specimens being prehistoric. In Colombia we find frog and monkey-like creatures represented as peeping over the rims of jars, but it is in Peru that ceramic modeling reaches its highest level. Here, we not only have animals and natural objects faithfully represented, but human heads so executed as to suggest their being portrait jars.

Painted and incised ceramic decorations tend to be geometric and often closely parallel textile designs, to be discussed under the next head. We shall, therefore, defer their discussion until the whole subject of design has been considered.

1. Tozzer, 1907. I.
2. Wilson, G. L., Am. Mus. Mss.
3. Bogoras, 1904. I; Jochelson, 1908. I.
4. Kidder, 1915. I; Nelson, N. C., 1916. I.
5. Holmes, 1903. I.
6. Moore, 1911. I.
7. Von den Steinen, 1897. I.
8. MacCurdy, 1911. I.
9. Von den Steinen, 1897. I, p. 264.
10. Holmes, 1903. I.

CHAPTER V

DECORATIVE DESIGNS

In the preceding discussions we have ignored the most interesting and suggestive sides of textiles and ceramics, namely, their decorations. Wherever such products occur we almost always find them richly ornamented by designs in color which constitute the greater part of the decorative art of their makers. Taking the New World decorative designs as a whole, we are impressed with their extreme geometric unrepresentative character and the rarity of realistic art. A stroll through a large museum reveals an astonishing complexity of geometrical design in contrast to similar collections from the Old World. Nowhere else do we find anything in basketry approaching the finest basketry decorations of the Pacific Coast or in pottery that of the Andean region. From the standpoint of æsthetic values, the ancient Old World products may be rated as superior, but the range and richness of geometric design in the New World cannot be denied.

Anthropologists have given the subject of decorative design a great deal of attention, and we consequently have for the tribes of the northern continent a body of special research literature not equalled by that for any other part of the world. Quite recently, the use of ceramic design as an index to chronology and relationship in extinct cultures has appeared as a special method in archæological research and promises a considerable development in the near future.[1] Unfortunately, no such progress has been made in the art of the southern continent or even for the Antilles and Mexico. Our first task, therefore, is to consider rather fully the status of the North American design problem and then to view the southern continent from that horizon.

TEXTILE DESIGNS

If we compare the decorations upon a representative series of baskets from the Rocky Mountain region with those upon

a series of pottery vessels from Arizona and New Mexico, there seems to be a definite similarity. Closer inspection suggests that this is true because certain combinations of angles and checker patterns are common to both. The chief point of difference is that curved lines and realistic figures are rare in basketry, whereas they occur with somewhat greater frequency on the pottery in question. Again, if we examine the blankets of the Navajo, we find a series of designs strikingly like those upon the basket series. Since we know that the Navajo weaving is of recent origin, we infer that many of their blanket designs were borrowed from basketry and because of the much greater distribution of the latter, that the pottery designs were also greatly influenced thereby.

An important point has been made that the technique of weaving itself places certain form limitations upon designs which tend to make them similar, irrespective of the wishes of the artist.[2] In all weaving we have a geometrical relation between the warp and weft elements since they have a right-angle relation to each other and, in the main, can build up a design by equal rectangular units only. In basketry these units are usually so large that diagonals can only be run as steps and even in cloth it is difficult to escape this effect. These stepped designs and diagonal rows of small squares constitute one of the prevailing characteristics of textile art, so that in our discussions of design distribution we must make full allowance for similarities due to the limitations imposed by the weaving technique.

For example, we find a certain type of designs for cane baskets in Louisiana, and passing over to northern South America,[3] we find baskets of similar materials with designs almost identical. In this case we have other facts that suggest this similarity to be but another example of culture diffusion. Yet, we can find baskets in some of the Pacific Islands which can scarcely be distinguished from cane baskets of the New World, if we consider the designs only, and in this case there is no good reason for expecting diffusion.

The limitations set by weaving are more clearly shown when realistic figures are attempted (Fig. 35). Painted pottery,

on the other hand, imposes no such restrictions in the matter of design, but leaves the hand free to make curves of any form. Accordingly, when we find the aboriginal potters of Arizona

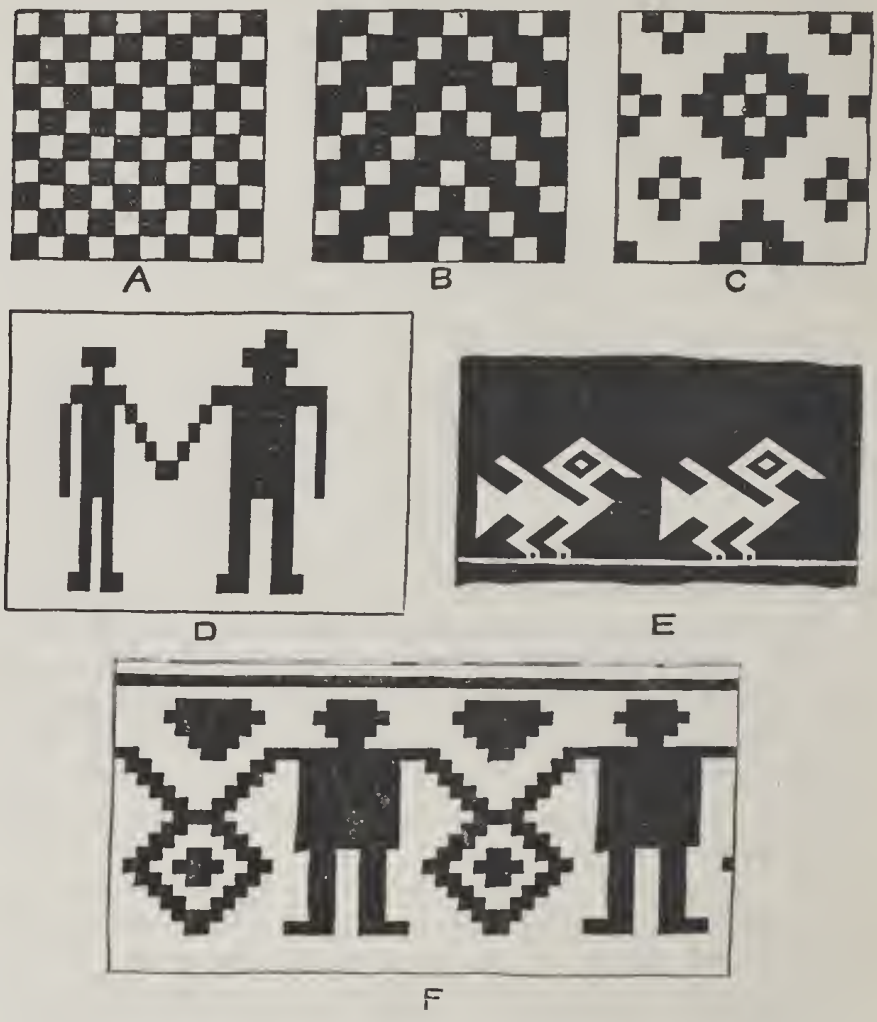

Fig. 35. Types of Textile Design. a, *Checker;* b, *Twill;* c, *A Typical Pattern from Cane Basketry;* d, *Design from the Penn Treaty Wampum Belt;* e, *Bird Figure from Peruvian Cloth;* f, *Design on a Peruvian Basket. Holmes, 1888. I*

and New Mexico using a great array of checked and angular patterns, with stepped lines, we must necessarily refer them to textiles.

Fig. 36. Types of Prehistoric Peruvian Textile Designs

Another significant point is that the extensive use of realistic figures in cloth occurs only where weaving is highly developed, as in Peru and Mexico. When we examine examples of such decorations as are preserved in our museum collections, we note that even so, these figures are greatly distorted to make their contours coincide with the fixed lines of weaving. Further, it is also in these same localities that pottery decorations become more realistic, suggesting that some allowance must be made for the degrees of complexity in the culture of the weavers. It may be that the simple designs upon New England pottery are about all that can be expected from such a crude cultural setting. Yet, we must conclude that in the earlier stages of their historical developments in the New World both textiles and pottery were decorated with geometric designs and that the use of realistic figures came later. This is somewhat at variance with a current theory of art genesis which considers geometric art to be mere conventionalizations of earlier realistic figures. We have already noted how the weaving technique itself conventionalized all figures and have recognized other factors producing conventional effects, but the cultural conditions in the New World do not seem consistent with the above theory of design origin. The total distribution of the several types of design points clearly to a development from the simplest geometrical textile designs to the realistic textile figures.

DISTRIBUTION OF DESIGNS

Like many other culture traits, designs tend to fall into geographical groups. While the boundaries to such areas cannot always be drawn with great precision, their centers can be located without much difficulty. We have noted that California seemed to be the center of the highest attainments in basket-making, and it so happens that this is also the great center for basketry designs. As indicated on the map (Fig. 17) the basketry area includes the great plateau region extending from well up into British Columbia southward to the non-Pueblo tribes of Arizona and New Mexico. Here we saw that two kinds of technique were in use, coil and woven bas-

ketry, usually twined weaving, and that while tribes tend to specialize now in one of these and then in another, this variation seems to have little effect upon the designs, for the same

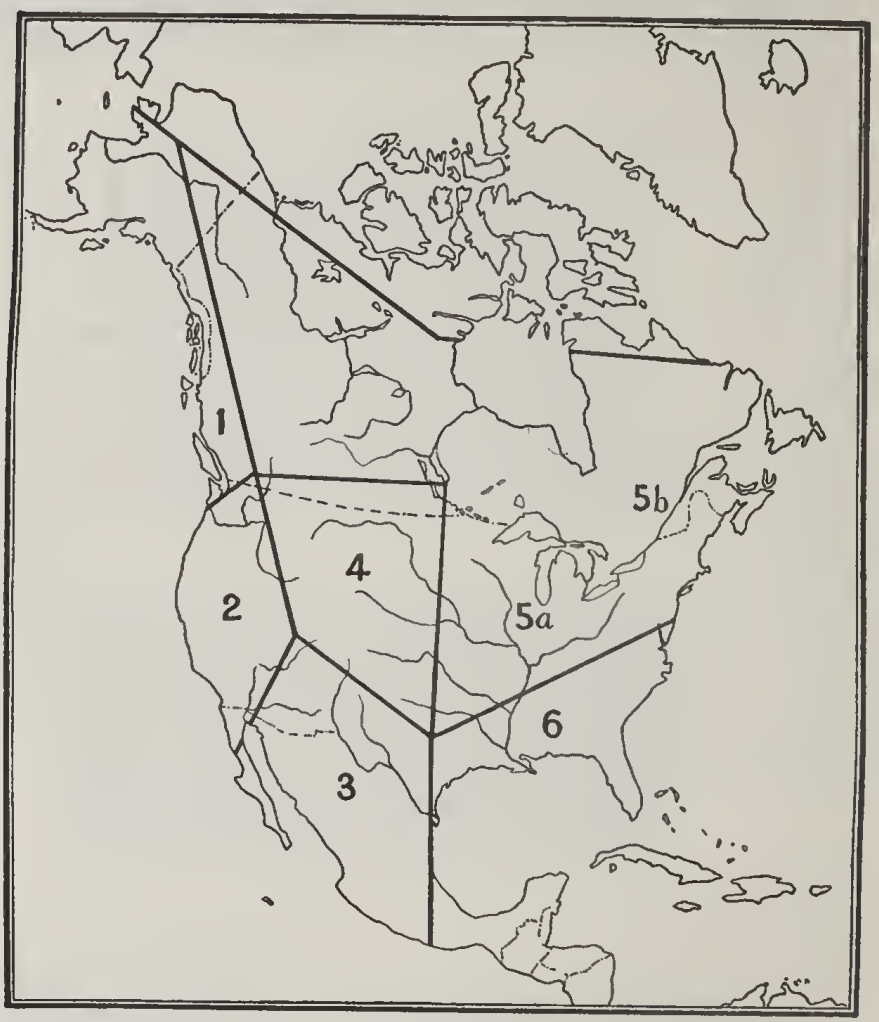

Fig. 37. Decorative Design Areas in North America: 1, *North Pacific Coast Center;* 2, *California Center;* 3, *Southwest, or Pueblo Center;* 4, *Plains, or Bison Center;* 5, *Eastern Center—subtypes* a *and* b; 6, *Southeastern, or Gulf Center*

designs occur upon both. The coil technique offers great freedom in design because of its similarity to embroidery; but this is, perhaps, compensated by the trick of overlaying

Types of North American Basketry

Fig. 38. A Pomo Basket, California

twined strands with thin strips of colored materials to produce the designs. In the inland salmon area, coil baskets are decorated by imbrication, which is also an ingenious overlay, and for that reason was most likely derived from twine overlay. The basketry of the Tlingit gives a different type of decoration, chiefly in the use of bands of overlay, but these are a secondary part of the art of the North Pacific area to which we shall return later.

Another important art center is to be found among the Pueblo peoples of the Southwest where we see an exuberant development of pottery designs and blanket decorations.[4] Archæological collections[5] show that, if anything, there has been a deterioration in pottery decoration during the historic period but, on the other hand, there seems to have been a marked development in blanket designs. We are clear that Navajo textiles have passed through a development of this kind, for the old specimens are almost entirely striped.[6] While Navajo weaving is supposed to be of recent origin, it is obvious that the designs were not copied from European techniques, but from aboriginal American models. Further, we have some textile remains from cliff ruins in which striped decorations are the rule and the same tendency is shown in Hopi and Zuñi weaving. A few exceptional specimens have come to notice that bear designs of another character, particularly those from the Gila River;[7] but these are toward the south and may therefore be intrusive.

However, our most important problem in this area is to be found in pottery decoration. If we consider modern Pueblo pottery only, we find that its designs are largely geometric in appearance, although a strong realistic tendency is also plainly evident. Even many of the highly conventionalized geometric forms prove to be symbols of mountains, clouds, thunder, rain, etc., while among them appear unmistakable drawings of plants and animals. Yet, taking modern pottery as a whole, the geometrical character of the designs seems to predominate. In the discussions of southwestern chronology, we shall see that the more widely diffused and older type of pottery is decidedly geometric in character. Thus, two of

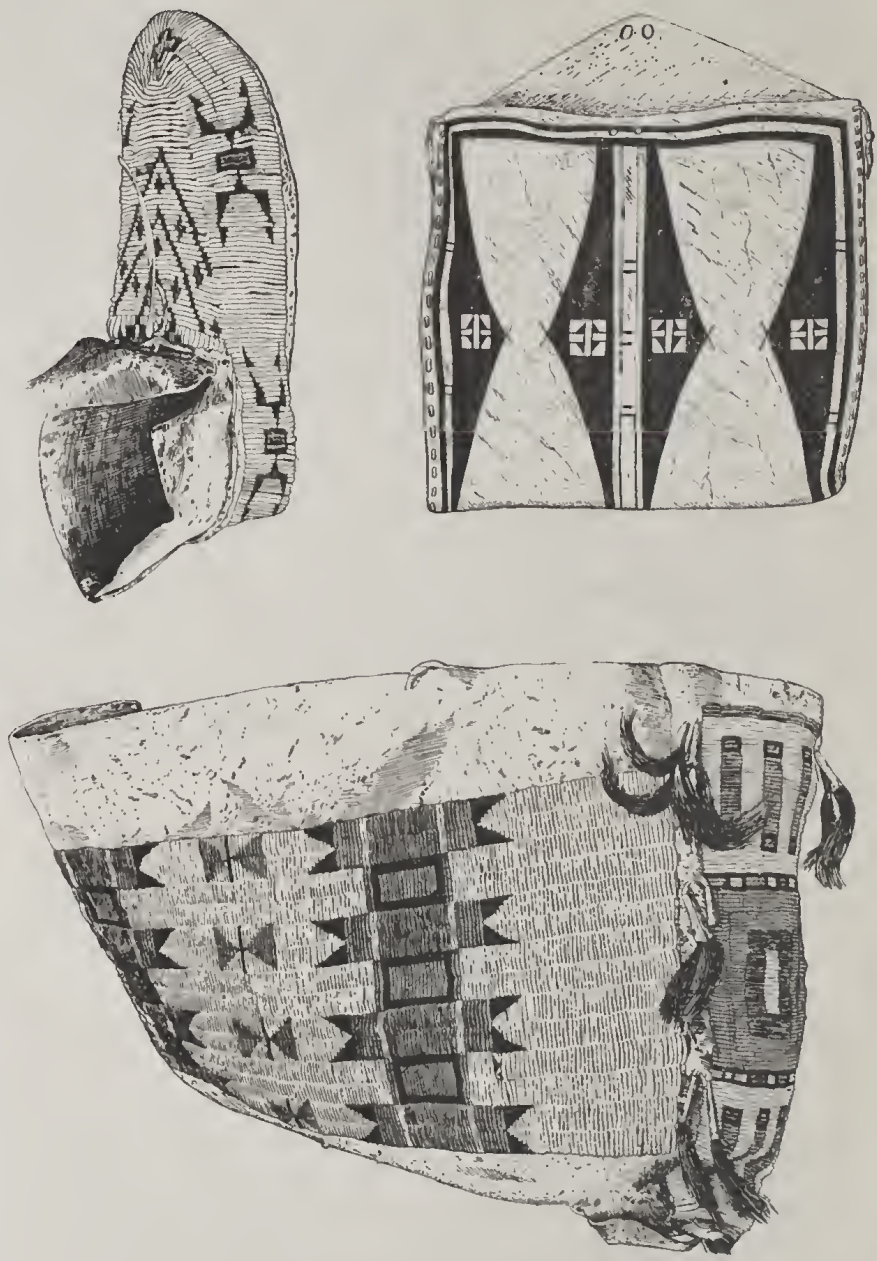

Fig. 39. Beaded and Painted Designs of the Plains Indians.
Kroeber, 1902. I

the favorite design concepts are the simple checker textile pattern and the step or "terrace." Again, if we look almost anywhere in the Pueblo area we shall find these patterns occurring. They have so sure a place in textile art and lend themselves so much less readily to freehand work that a non-pottery origin is suggested. Quite recently a localized tendency toward realistic pottery painting has come to notice in southwestern New Mexico, but even here we also meet with the familiar geometric designs.[8]

Adjoining the southwest and east of the great basketry area is the bison area, which is weak in basketry and cloth, but still has a highly developed embroidery of beads and quills in which the designs are geometric and manifest many of the characteristics of textile designs.[9] In fact, the way in which beads and quills are handled in this area requires that designs be built up by accretions of small rectangular surface contours, which is just what we have in weaving. If our general principle of technique limitations holds, we should expect to find geometric forms prevailing. This is exactly what we do find (Fig. 39).

Even among the basket-making Apache of the Southwest, we find objects of skin decorated with designs upon covered surfaces of beads. This is clearly an intrusion from the bison area because it is only now and then that we find identity between the designs on Apache baskets and objects of skin, each having a style of its own. On the other hand, these beaded designs are quite like those found far out into the buffalo country. These buffalo hunters did not decorate pottery, in fact, some did not even make it, but they did paint rawhide objects and, strange to say, even this freehand work was in geometric designs not at all unlike those in beads and quills. While the reason for this is not entirely clear, we note that all the beadwork is by women, who also paint the geometric designs, whereas the men who paint upon robes, tents, etc., use realistic figures. This suggests that the difference may be merely a matter of social convention.

An important problem is the origin of Plains art as a whole. Though we have shown that bead technique imposes textile

limits upon the decorations, the fact that the Plains area is in direct contact with basketry-making peoples and the weavers of the Southwest reveals the possibility of diffusion. While this, like most other problems, is one for the future, there are several good reasons for believing that the art of the bison, or Plains area, is in the main an independent development. In the first place, its center is in the very heart of the area, while it is weakest on the margins. In its great western Shoshoni fringe we find a condition not unlike that of the Apache in that beadwork and basketry exist side by side but with different design systems.

There is, however, a more direct approach to the problem by the analytic comparison of designs. Kroeber [10] has carefully analyzed the designs of California baskets and Plains beadwork in search of the prevalent design units. When these are found, they prove to be, in the main, very simple geometric forms and though many can be very closely matched for the two areas, their very simplicity, taken with the principle of textile limitation, lessens the probability of their common origin. On the other hand, if we take more complex design wholes we find very little correspondence between the two areas, for each has a number of highly unique designs not found in any other part of the world. Hence, even this method tends to assert independence of origin.

To the north and east of the Plains area we have another art area in which neither ceramics nor true textiles play an important part. This region comprises the greater part of the caribou area and the northern half of the eastern maize area, a region in which, although the decorations are again by beads and quills, there is yet a distinct type of design. Here we have exactly the opposite of the preceding, for instead of textile-like designs we find curved figures and more or less realistic, plant-like forms. The cause for this very extraordinary contrast is an important problem.

When we try to locate the geographic center of this art, it proves somewhat elusive, but closer inspection reveals two sub-centers, one in eastern Canada, the other near Lake Superior. The eastern sub-type has been brought to notice

Photograph of Blackfoot Women by Fred. R. Meyer

Fig. 40. The Decorative Art of the Plains Indians

by Speck [11] under the designation *double-curve* art (Fig. 42). These curved designs, while obviously resembling vines and leaves, are still somewhat less realistic than beadwork designs of the western sub-type, perhaps because of their greater conventionalization. Though these curved designs do occur in beads and quill, they are more frequently found incised in birchbark or painted on skins. The best-known examples of the latter are the Naskapi coats in museum collections. These observations suggest that this eastern sub-center was originally dominated by freehand work upon skins and bark

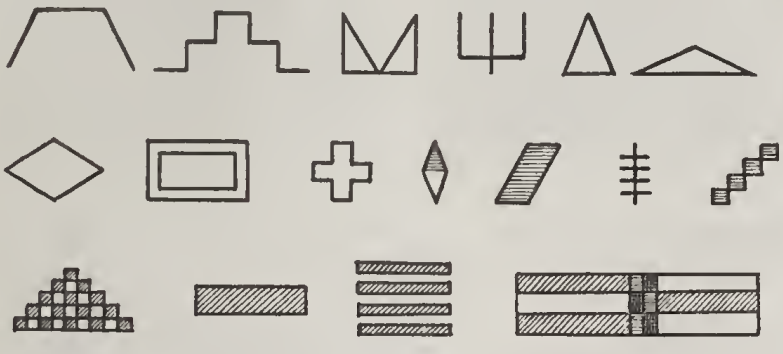

Fig. 41. Design Elements Used in Plains Indian Beadwork. Kroeber, 1908. II

from which the somewhat similar beaded designs were most likely copied. No cloth is made here and practically no woven decorated basketry, but we find some woven wampum belts and some bands of quill and moose-hair interwoven with bast fiber, in which the designs tend to be geometric. So far, we do not recall a single example of the double-curve art in these truly woven objects. All this suggests that we have here at the eastern sub-center a type of design which developed from freehand drawing upon skins and birchbark.

When we turn to the western sub-type we find practically no painting upon skins or decorative drawing upon bark and the beaded decorations correspondingly more numerous and decidedly floral. From this sub-center come those admirably beaded flowers seen in our museum collections. Speck [12] has included the more conventionalized examples of these under

his double-curve motive, but all they have in common seems to arise from their universal floral foundations. While there is little in the way of skin painting accompanying the western sub-type of beading, there is a far greater textile develop-

Fig. 42. Decorations on Birchbark from Eastern North America. The upper figures represent the side and bottom of a bark vessel from the Penobscot Indians. The lower sketch is a typical "double curve" design. (Center 5b, Fig. 37.) Speck, 1914. I

ment, especially at the sub-center. The weaving of bands containing quills or moose-hair is a feature in the Déné region. From the Ojibway of Wisconsin southward, we find a rather high development of bag weaving and many forms of mats. The designs upon quill bands and mats are almost without

exception geometric, while bags show two forms—purely textile geometric and realistic animal figures. Drawing and sketching upon birchbark was developed almost to the point of writing and in that sense was not decorative. It was, however, entirely pictographic. Wooden objects were not infrequently adorned with incised curved designs somewhat like the floral effects in beads. The chief differences, therefore, between the two sub-centers are the disturbing textile developments in the west, with a decided realistic tendency in beadwork, while in the east freehand double-curve floral figures prevailed. The similarities are in the more fundamental character—a predominatingly freehand floral decoration. In the preceding areas we found textiles or embroidery techniques in the majority, and at the same time the decorative art was geometric. But here in the north and east we find textiles extremely weak; yet, when they do appear they tend to geometric forms. Beadwork, however, more often followed the freehand motives than not. So we see here the suggestion of a chronological relation in that this particular beaded art was derived from bark and skin decorations.

The extreme floral character of some of this beadwork has led many to regard the whole as a post-Columbian development. The very wide distribution of the Cree and Montagnais, together with their very early intimate association with French colonists, presents a favorable condition to rapid diffusion. Yet, the very characteristic double-curvė art on bark and painted skins cannot be attributed to Europeans. All that can reasonably be conceded is that their trade stimulated the use of beads, and their decorative preferences tended to emphasize the old floral character. On the other hand, there seems not the least reason to doubt that the very striking beaded flowers of the west are due to European influence.

Strange to say, all the regions we have so far considered are almost completely innocent of carving or modeling in the round, everything being flat. But we now turn to the North Pacific Coast and Eskimo areas where carving is the leading art. Faint traces of carving appear at the northern border of California and grow stronger as we ascend the coast until we

reach the Haida of the Queen Charlotte Islands which seems to be its geographical center. In the central part of the area we find the great totem poles and colossal grave figures, besides an endless array of smaller objects, all in wood. As we proceed still farther northward, wood tends to disappear and ivory to take its place. Like most other traits, ivory carving begins to be frequent with the Tlingit and gradually grows in intensity as wood disappears, the difference appearing merely as a matter of environment. Then as we go around the north coast of Alaska and eastward along the extended habitat of the Eskimo, carving almost dies out. This peculiar distribution among the Eskimo suggests an indirect historical relation with the carving center.

The intense development of carving at this center has a noticeable effect upon decoration. Boas [13] has shown how the very curious relief carving upon the outsides of wooden vessels results from an attempt to carry around the contour of animals or men in such a way that the whole may stand for a realistic model. Naturally, when flat surfaces are treated the whole figure is spread out upon it. Sometimes these designs are merely laid out in color and though no doubt more conventionalized thereby, they are still the undeniable offspring of carving. All this is a feature of the central group of tribes where the art is most intense and where it is, in part, at least, the expression of a very complex system of beliefs concerning family ancestors. North from the Tlingit and south from the Nootka of Vancouver Island we have many vessels carved in the life-like forms of animals, but practically no trace of the relief ornamentation just mentioned, a fact which strongly suggests that this feature is purely a development of the more intense art at the center and that it is, therefore, relatively recent.

We have noted that there is also a textile center in this region, but we now see that it does not coincide with that for carving, its location being inland among the Salish peoples. Emmons [14] has made a good case for the relatively recent introduction of the Chilkat blanket to that tribe. In this famous textile we usually find the queer spread-out animal

Fig. 43. Art of the North Pacific Coast Indians as Represented in the American Museum of Natural History

forms noted above and not the usual type of textile designs. It has been clearly shown that this decoration was directly copied from house fronts.[15] Now, if the blanket came from the Southeast it must have arisen in a place and at a time too remote to have incorporated this decoration at the start. In fact, there is evidence of several sorts to show that these textiles were originally decorated with bands of small geometric figures. The basketry of the Haida and Tlingit [16] shows a similar banded style, and this, in turn, has a curious resemblance to the quill woven bands of the Déné people of the adjacent caribou area. The significance of the latter is not clear.

Thus, we find in this art area a good example of conflict between a carving center and a textile one, the Chilkat blanket being about the only compromise. The Eskimo of Alaska took up basketry but not its design decoration.

Next we turn to a more difficult problem; namely, the art of the southern half of the eastern maize area. The data available are so much less adequate than for the preceding that one must hesitate to even enter such a discussion. For though, as stated elsewhere, we have historical records vouching for a higher textile development in the Gulf States than in the North, no specimens have come down to us. There are reasons for suspecting that the bag weaving we have noted for the upper section of the Mississippi Valley is in a large measure the fringe of this area, but without some corroborative data we are scarcely justified in formulating it as an assumption. Basketry has survived in Louisiana,[17] where we find cane weaving in designs of black and red. As previously stated, the material and technique restrict designs to just such as we find here, and from this it may be inferred that they truly represent the former basketry art of the whole southeastern area. What may be the relation of the pottery found here to the historic tribes is also a puzzle. If this pottery was extant at the period of discovery, then one of the most distinctive design concepts was the spiral scroll.

When we turn to the art of the intense culture area, our problem becomes very largely one of archæology and the yet undetermined sequences of culture, because the thoroughness

of the Spanish conquest practically obliterated the native culture. No doubt careful research would still reveal many surviving traits in the present populations of these countries but such studies have not been sufficiently numerous to assist us. As suggestions we may cite Tozzer's [18] study of the Lacandones as a surviving Maya people.

With numerous dense groups of people, as in ancient Mexico and Peru, where a political organization gradually overflowed and submerged the successive local groups, there must have been a great variety of art types that persisted in the homely affairs of life; but the succeednig centuries of European trade

Fig. 44. Prehistoric Sketches of Textile Designs from the Maya. Spinden, 1913. I

seem to have swept them into oblivion. For Mexico and southward we have no clear idea of the aboriginal textile development. Among the present Huichol [19] we find considerable weaving in which the designs have a marked realistic tendency. So far as known, this is a trait of the modern textile art for the whole stretch of country from the Rio Grande to Panama. While it is certain that we have here a result due in part to contact with Spanish culture, there is no reason for assuming that a new textile art was created since the conquest. The general similarity to Peru, in the range and direction of conventionalization, is sufficient warrant for assuming an original textile art of a similar level. We may, however, get some idea of Maya textile design from the known sculptures and codices.[20] According to early Spanish authorities, the Maya peoples were the most expert weavers in New Spain, which statement, if true, enables us to gauge the whole state of the art from the illustrations the native artists have left us. From these the specific resemblances to modern

native Mexican weaving are clear [21] and also the general resemblance to Peruvian styles previously noted (Fig. 45).

When we turn to the pottery of this region, even less survives among the living peoples so that any study of the ceramic art also becomes essentially archæological. However, the

Fig. 45. Mexican Textile Designs. The costumed figure is from a Prehistoric Maya Drawing (Spinden, 1913. I.), but the other sketches represent the work of modern Huichol Indians (Lumholtz, 1904. I.), in Northern Mexico

ceramic collections in our museums are not extensively embellished with painted designs. In contrast to the pottery of the Pueblo area they are plain, modeling in relief and realistic painting here taking the place of mere design. In the Panama area, including Costa Rica and the Chiriqui district, we have a complex of alligator and armadillo designs, recalling again Peruvian and some modern Mexican textile decorations.[22] In a few instances the Maya were particularly successful with

Fig. 46. A Series of Peruvian Designs. Mead, 1916. I

textile-like designs for mosaic and stucco work, but these, the well-known case of Mitla in Mexico,[23] and the single example at Chanchan, Peru, are the striking exceptions to the rule that wherever architectural embellishment is undertaken, it tends toward realistic carving.

When we come to South America, we find that certain accidents have preserved us a good series of aboriginal textiles from Inca culture. In the technique of design these ancients were remarkably proficient, even to the extent of using complex color sequences.[24] On the whole, their designs tend to be realistic figures: men, cats, birds and fish being distinguishable in many degrees of conventionalization. In fact, we find here the best illustrations of the geometric biases in loom weaving. Associated with this art is an equally superior development of pottery decoration. One prominent feature of this pottery is the introduction of life forms, so that we have jars representing persons, birds, monkeys, fishes, etc., in which the modeling is of a high order. The decorations are in both color and incised work. In color, we have the great triumph of Nasca and Titicaca ware, so far superior to anything yet discovered in the New World. The painted designs upon this pottery are comparable to those upon cloth in that they have the same realistic tendencies. Certain fixed conventional forms appear both on pottery and cloth, suggesting the fundamental unity of design concepts for both ceramics and textiles.

As we go out from Peru in either direction, pottery decorations become inferior; consequently, we may be sure that the center of the art was in that country. The great problem for the future is to discover the historical relations of this center to the adjacent cultures. If we follow around the north coast and down into Brazil we find greater use of painted pottery decorations than in the corresponding parts of North America. No doubt one factor in this distribution is the presence of the very strong Peruvian art center. In a similar way this Peruvian influence can be seen in Chile and the adjacent parts of Argentina, presumably again connecting with eastern Brazil.

As to the textile designs in these outlying regions, we are so ignorant that little can be said, though the explorations of

German anthropologists [25] among the wilder peoples of eastern Brazil give us a fair idea of designs in a few localities. As previously noted, we find here the designs peculiar to cane basketry in all parts of the world; however, some textile work exists in which simple striped designs occur, though on the whole the designs are similar to those upon basketry. Painted decorations upon bark and wood are also found which have a geometric character; but these are almost entirely made up of triangles.

In the northwest Amazon country there is an identity between pottery designs and those used in body painting.[26] The colors are laid on in large masses, but in the form of true textile designs. A similar style of body painting has been reported for Panama.

This relatively brief survey of New World art reveals some interesting general characteristics. The experience of anthropologists shows that by generalizing design characteristics we can consistently differentiate a few centers of development and influence. These prove also to be centers of specialization in industrial art. For example, the tribes of California are lamentably deficient in everything but basketry. Again, we see that geometric art and realistic decoration tend to be antagonistic to each other in the sense that wherever one predominates the other adjusts itself to it. But while this is so strikingly true of the centers we find many intermediately situated peoples practising the two or more special arts of the nearest centers, but less successfully. In North America particularly, we find a tendency for women to produce the geometric art and men the realistic. That this has an important psychological basis is unlikely since the distinction is clearest among the groups where hunting is the chief work of the men. Here the textile arts fall to the women, who thus find their activities limited. Among the Pueblo peoples on the other hand, where the men wove, we still find geometric art.

Finally, we must not forget that we have been but skimming over the surface of a very complex problem. Each small territory presents its own particular characteristics. Art, too,

Fig. 47. A Peruvian Poncho
This is a prehistoric textile of fine weave and typical in design

has everywhere strong individualities which tend to obscure the common elements, thus making every thorough survey of even a small area extremely exacting. The work of Kroeber [27] in California demonstrates that often the large areas we have designated can be resolved into many small geographical subareas, which can, in some cases, be further differentiated into tribal types. However, all this is too intricate for discussion here.

SYMBOLISM

No discussion of our subject, however brief, can disregard symbolism. Though an old subject, it seems to have been given new life by Von den Steinen's observations in Brazil [28] and Haddon's [29] vigorous exposition of the realistic origin theory. Following this, with Boas [30] as leader, a number of American anthropologists began an intensive study of designs in the basketry and beadwork areas we have discussed. It was found that all tribes have names for many of their designs and in some cases, at least, employ these names to express ideas. Since these are almost always derived from familiar objects, as bird, feather, tree, etc., we are confronted with the possibility that the names were given at a time when the design was truly pictographic. This theory must be considered notwithstanding that we found certain objections to such origins in the influence of the technique. Accordingly, we have this problem: When a design is called by a definite name, is that name a clue to its historic origin?

The study of design names shows that this nomenclature develops according to the practical needs of the workers, for among the Pomo [31] and Dakota,[32] who lead in their respective centers, designs have been analyzed into their structural elements and names given to the same. Further, when definite composite designs have been established, the names of the separate design elements in the complex are compounded into a single term. In other words, we have an intense systematization of design composition, with a corresponding terminology. When we turn to less specialized decorations like the Maidu [33] and Arapaho [34] we find that they have a much longer

list of design names, which upon inspection prove to be the result of a less elaborate classification and a failure to comprehend the advantages of design analysis. This forcibly suggests that the present association between a design and its name is quite likely to be the result of other than genetic causes.

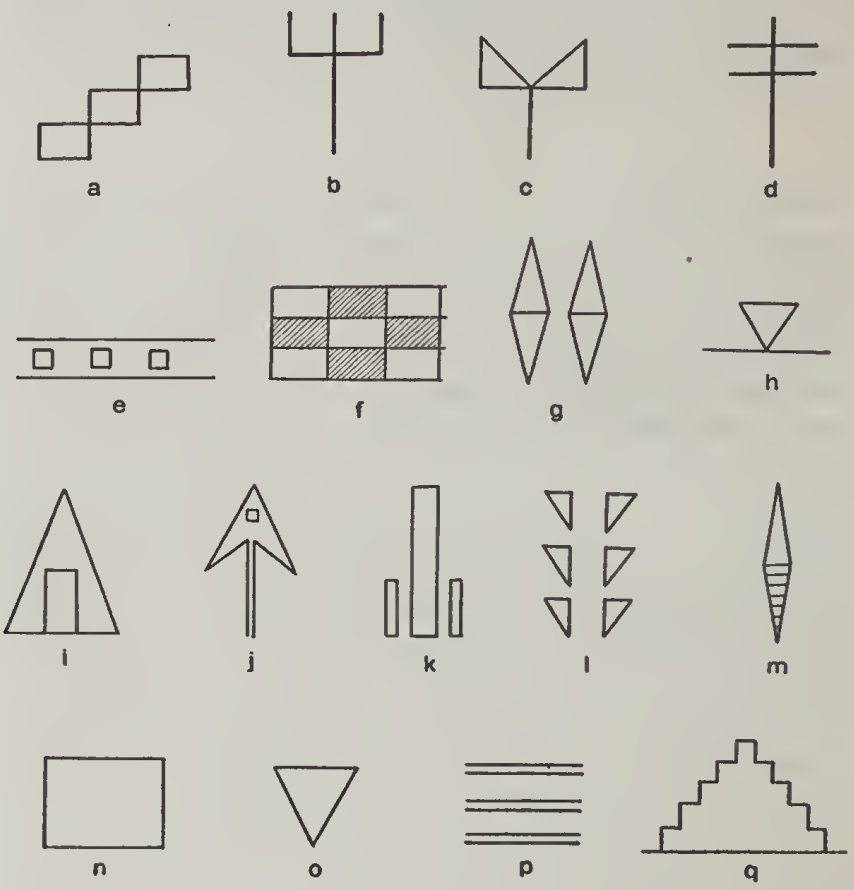

Fig. 48. A Series of Designs and Their Names, from the Dakota Indians: a, *Twisted;* b, *Full-of-points;* c, *Forked tree;* d, *Dragon-fly;* e, *Filled-up;* f, *Tripe;* g, *Feathers;* h, *Leaf;* i, *Tent;* j, *Arrow;* k, *Three-row;* l, *Vertebræ;* m, *Whirlwind;* n, *Bag;* o, *Pointed;* p, *Trails;* q, *Cut-out*

Another way of testing the case is to compare the designs associated with one name. For example, from the special literature we find "flying goose" designs among the Tlingit, Thompson, Pit River, Maidu, Wintun, and Yurok, but we fail to find these designs identical or even similar. The tab-

ulation of "butterfly" designs gives the same kind of result. The converse of this experiment is to take a single design and tabulate its names. Thus, the Pomo "quail tip" design is found elsewhere under the names bushes, pine cones, mountains, squirrel foot, and foot. This suggests that we must allow for the borrowing of both designs and names independently, or at least for the former.

Now while this is very good argument against the wide application of the design name theory of origin, it does not by any means prove that in the beginning the decorator did not copy from nature, for subsequent and repeated borrowing would completely disassociate the names. On the other hand, the steady growth of this art would produce a conventional naming system of whose existence we have good evidence in the published studies. Also, the acquisition of textile decoration requires the comprehension of simple steps, or elements, before mastery can be acquired over complexes. It is inconceivable that decorative art began with the most complicated designs and developed into the simplest; and although it sometimes happens that designs do degenerate to mere dots and bars, yet there is no reason for believing that the whole of decorative design was evolved in this way.

Unfortunately, we lack similar studies for pottery decorations, but the objective analysis of certain local types by Fewkes [35] gives us ground for suspecting an analogous relation of names and designs. It is clear, however, that in pottery decoration we have different technical conditions; yet, one must assume that beginners would start with very simple forms, as in textiles.

However, in the art of most peoples we find a few designs that rise to the level of true symbols. Among the best known New World symbols are the cloud terraces of the Pueblo peoples and the "whirling logs" or swastika [36] of the Navajo. The list is, however, very short, but in addition we find many degrees of symbolic association as among the Arapaho, where current designs were often chosen by an individual to stand for some personal interests peculiar to himself. Again, not a single case of real symbolism has so far been reported for the

many basket makers of California. Its strongest development is in the Southwest which is, perhaps, the center of its northern dispersion. Among the Navajo we note that because of their sacred character the true symbols are not used in blankets, and in the Plains we further note that the conventional and æsthetic relations are practically never modified to meet the demands of interpretation; it is always the latter that is sacrificed. All this indicates that we are dealing with decoration primarily, upon which is occasionally grafted some symbolism. The facts are that practically all of the religious art of the

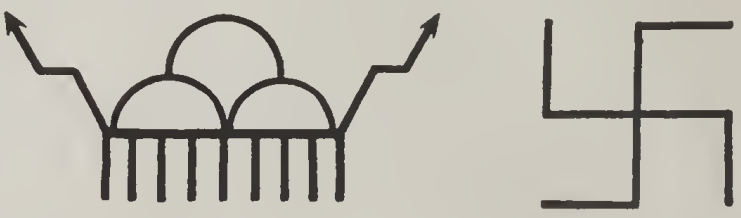

Fig. 49. True Symbols. The first represents the clouds, or "cloud terrace" of the Pueblo Indians; the second, the swastika, or "whirling logs" of the Navajo

New World is highly realistic and, therefore, stands apart from the art of ordinary decoration.

In conclusion, we may recall our initial question: Is the pattern name at its inception symbolic, or even representative? We can safely say that in most cases it was certainly neither. The suggestion is that symbolic art is primarily realistic, and that many true symbols may be explained as derived from pictures; but true symbols are relatively rare in the geometric designs we have studied and we have consequently no good reason for assuming that many of these as a class were once realistic. In short, the problem is an historical one. We have seen that geometric art is sometimes under pressure from realistic art and perhaps is always so. Hence, the feeling that its designs should be representative may universally arise and so account for all these design interpretations as secondary phenomena.

1. Spinden, 1913. I; Kidder, 1915. I.
2. Holmes, 1888. I.
3. Schmidt, 1905. I, p. 330.
4. Kidder, 1915. I; James, 1914. I.
5. Fewkes, 1898. I.
6. James, 1914. I.
7. Hough, 1907. I.
8. Fewkes, 1914. I.
9. Boas, 1903, I; Kroeber, 1908. II.
10. Kroeber, 1905. I.
11. Speck, 1914. I.
12. Speck, 1914. I.
13. Boas, 1897. I.
14. Emmons, 1907. I.
15. Boas, in Emmons, 1907. I.
16. Emmons, 1903. I.
17. Swanton, 1911. I.
18. Tozzer, 1907. I.
19. Lumholtz, 1900. I.
20. Spinden, 1913. I, p. 148.
21. Lumholtz, 1904. I.
22. Holmes, 1888. II; MacCurdy, 1911. I.
23. Joyce, 1914. I.
24. Mead, 1906. I.
25. Von den Steinen, 1897. I; Koch-Grünberg, 1908. I.
26. Whiffen, 1915. I.
27. Kroeber, 1905. I.
28. Von den Steinen, 1897. I.
29. Haddon, 1902. I.
30. Boas, 1903. I.
31. Barrett, 1908. I.
32. Wissler, 1904. I.
33. Dixon, 1902. I.
34. Kroeber, 1902. I.
35. Fewkes, 1914. I.
36. Wilson, Thomas, 1896. I.; Matthews, 1902. I.

CHAPTER VI

ARCHITECTURE

THE only regions in which building rises to the level of architecture are those occupied by the higher cultures of Mexico and Peru. Roughly considered, there are indications of three centers of development: Maya, Nahua and Inca, though in last analysis we may find but two, the Maya and Inca, using those terms in their broadest sense. The chief characteristics common to both are rectangular groundplans, massive masonry walls, often of rubble, and the absence of the arch. The last is probably the most important factor, for the clumsy method of a stepped ceiling, closed by a slab of stone, not only doomed the builders to narrow rooms, but required very thick, firm walls for their support. The published plans of the most typical ruins show long, narrow rooms or tiers of rooms, the widest so far reported being 14 feet.[1] That these ancient builders were aware that at best this method of vaulting gave but weak support, is shown by the tendency to support upper stories upon a solid masonry core around which the lower rooms were grouped.[2] This may also be one cause for the relative infrequency of storied structures and the almost universal practice of securing height and elevation by building upon artificial or natural mounds (Fig. 52). The necessity for narrow rooms no doubt led to the enclosed rectangular court plan, which prevailed both in the North and the South (Fig. 51). Curved or circular walls are very rare and when found are isolated and not a part of a rectangular building. Consequently, we have a plain rectangular contour as a universal character.

Windows are very rare, especially in the North, and the doors are usually rectangular with straight lintels. Colonnades formed with rectangular stone supports are common, and in a few cases we meet with the cylindrical pillar, but it

did not develop far enough to constitute an architectural feature. Some remarkable feats of masonry are found, and the skill of these ancients in handling cement and transporting huge masses of stone excites our admiration.

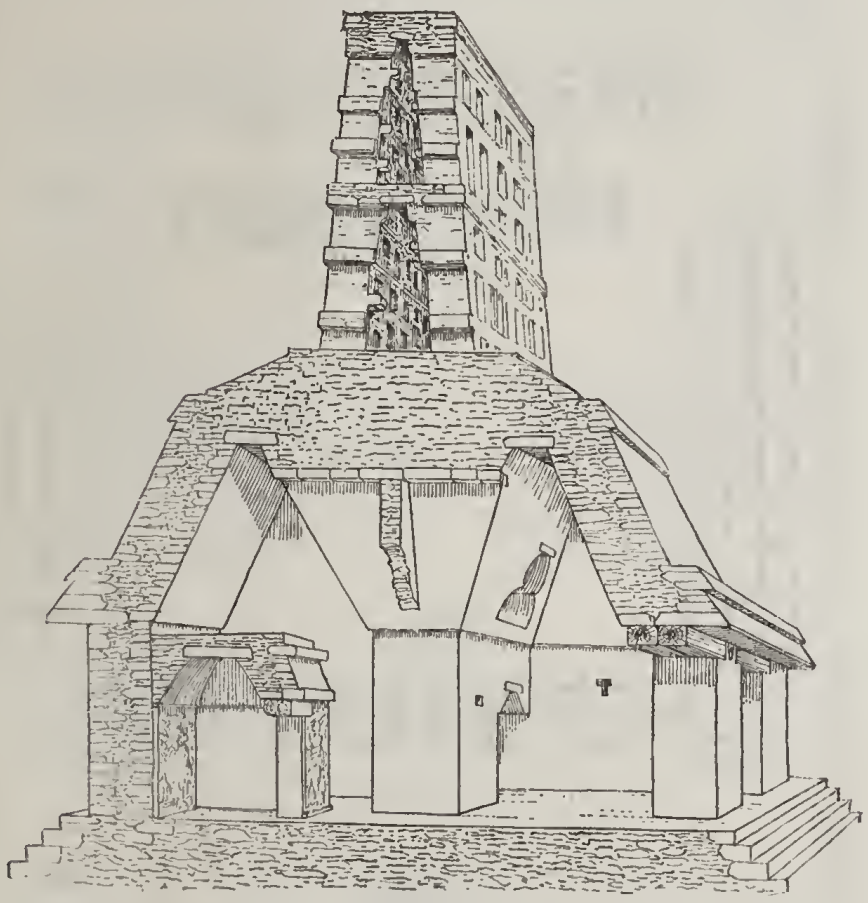

Fig. 50. A Cross-Section of the Temple of the Cross, Palenque, Chiapas. Holmes, 1895–1897. I

In the essential characteristics we have noted, there is little to distinguish between the buildings of Peru and Yucatan, though, as we shall see presently, they did have important differences. The present state of our knowledge suggests that all the ruins of southern Mexico and of the adjoining Central American states are historically related; but the type seems to disappear toward the Isthmus and reappears in Ecuador.

The disconnection of these two centers in the face of their common structural characteristics presents an interesting problem as to how much of this is due to borrowing. If we

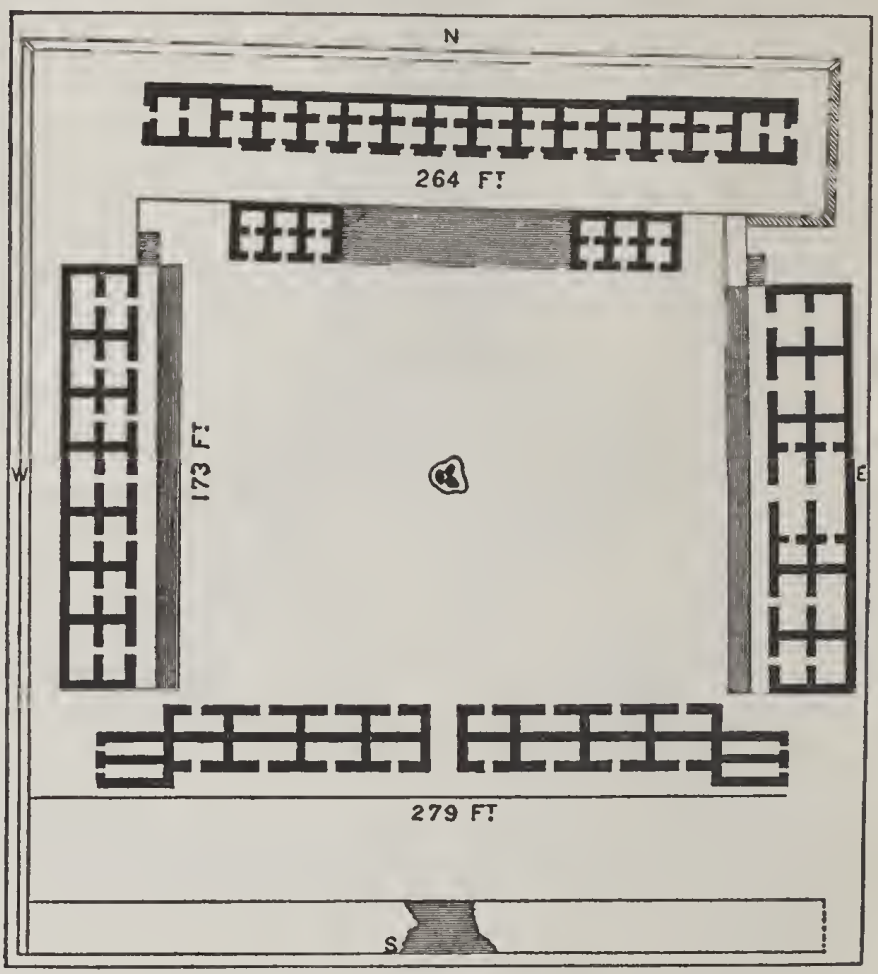

Fig. 51. Groundplan of the House of the Nuns, Uxmal, Yucatan. Morgan, 1881. I

take a little broader view, we shall find certain more widely distributed building concepts. First, the pyramidal mound for burial seems to extend from northern Mexico to the Isthmus and then to recur in Colombia, passing through Ecuador and down into the coast of Old Peru. At least in one part of the

Inca domain we find buildings upon them. In fact, their general absence in Old Peru is accounted for by the rocky nature of the country, which affords sites of natural elevation to which buildings were frequently adjusted by terraces.[3] It may be of interest to note that the pyramid mound both for burial and building sites extends up into the Mississippi

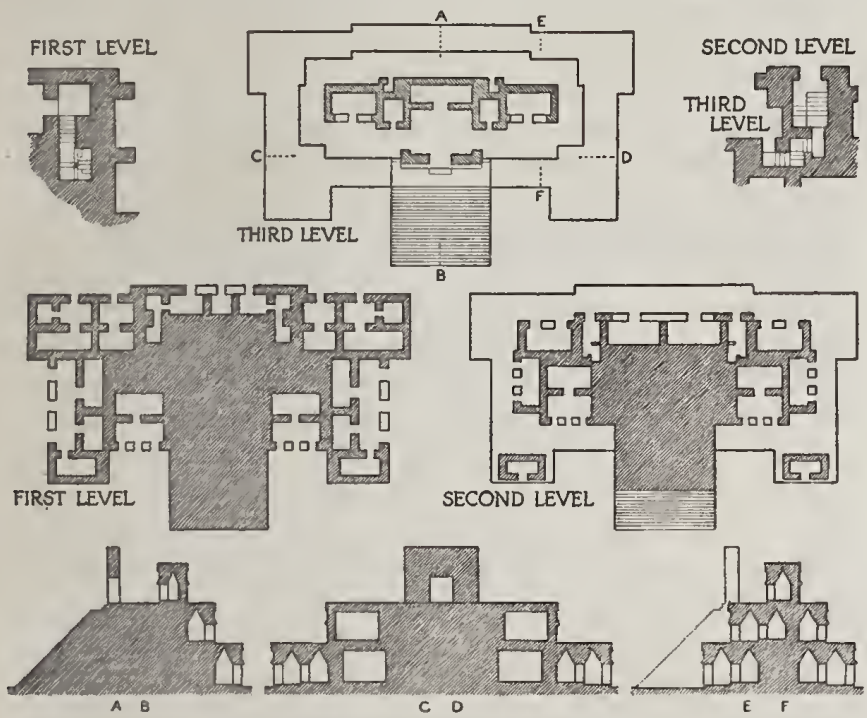

Fig. 52. Elevations and Groundplans of the Ruin Known as Santa Rosa Xlabpak, Yucatan. Spinden, 1913. I

Valley as far as the famous Cahokia of Illinois, and that this distribution is continuous with the general mound area of the upper valley. In other words, the occurrence of mounds of this type has a generally continuous distribution from the Great Lakes of the North to the coast of Old Peru of the South. Throughout, they are most numerous in level districts.

The northern limits of building attributed to the Nahua are on the Gulf Coast about the 24° of latitude, or in striking distance of the Rio Grande. Though all the later northern buildings are far less preserved than those of the older Maya,

they seem to have one suggestive difference, the absence of the vaulted ceiling and the consequent increased size of rooms. The rooms were probably flat and supported by beams resting upon internal pillars where necessary (Fig. 53). It seems strange that the Maya did not make more use of wood, but the Nahua style reminds us of Pueblo architecture, where beams of wood support the ceilings and roofs.[4] Thus again, we have an interesting case of continuous distribution. It is certain that the large and imposing ruins did not house the bulk of the population. The surviving examples show that the prevailing habitation was a small, rectangular one-room house whose essential structure, when of stone or adobe, was the same as found in the several units of the so-called palaces and temples, except that the roof was thatched. In Peru, the roofs were often supported by ridge poles which would give us about the same interior effect as the stepped ceilings. The walls of the houses take three forms, all of which may be encountered on either continent; namely, stone, adobe and mud reinforced with canes or wattling. Studies among the Pueblos of New Mexico have indicated that when we know more of that area we shall find a period of single detached adobe and stone rectangular houses preceding the composite pile of the modern pueblo. In fact, the Pueblo Indians of the present show a disposition to revert to the detached house, which does not materially differ from a single unit in the village structure. In like manner, we find in Peru a grouping of single houses around a court so as to form a complete enclosure, and the groundplan of these is not essentially different from those of the preceding structures. Similar conditions have been reported for the Maya district.

We see, then, that in at least two particulars we have a broad cultural base for the highly specialized building arts of the Maya and Inca. That all these widely distributed characters result by diffusion from these two centers is scarcely logical, for even cultures are not built of nothing, but all have a long train of historical antecedents. It is much more reasonable to assume that diffusion, and perhaps other factors, brought a certain extended uniformity in house-building

before the final burst of higher culture in these two centers. Granting that in this burst they may have been independent, they nevertheless had the same heritage from which to fashion their art.

One argument for their independence is to be found in the secondary decorative features. In this respect the northern buildings are far in the lead. The embellishment of the façades is often intricate and full round sculptures are let into the walls by tenons; stucco reliefs are built out upon rough skeletons of stone work; and elaborate mosaics of separately carved stones are arranged so as to make grotesque faces, as

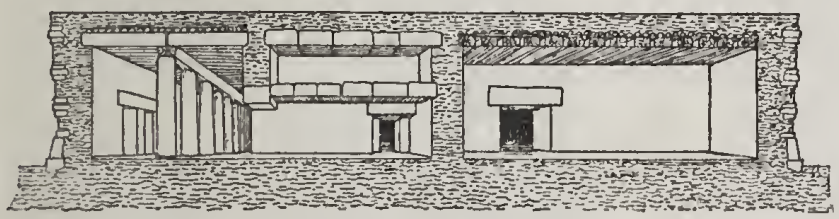

Fig. 53. Restored Section of the Hall of the Six Columns, Mitla, Mexico. Holmes, 1895–1897. I

well as geometric patterns. A special feature is the use of monolithic monuments commonly called stelæ, placed around and among buildings, the surfaces of which are richly carved with pictographs and hieroglyphs. The exterior and inside ornamentation was often painted in a very skilful way.

When we turn to Peru, such monuments are conspicuously absent and the exteriors of the buildings are, in the main, plain.[6] Still, we have an approach to it in the celebrated stucco walls of Chanchan, bearing an elaborate textile design, and in the inland we find traces of painting upon smooth stucco, suggesting that there was a great deal of such ornamentation that has disappeared. Then we have a few noted monoliths, as the Chavin stone and the very remarkable gateway at Tiahuanaco. To these may be added the curious sculptures at San Augustine, Colombia. Both the stucco and the monolithic carvings have a certain general resemblance to those of the Maya, but on the other hand, they have great differences. It is also noticeable that they have their counter-

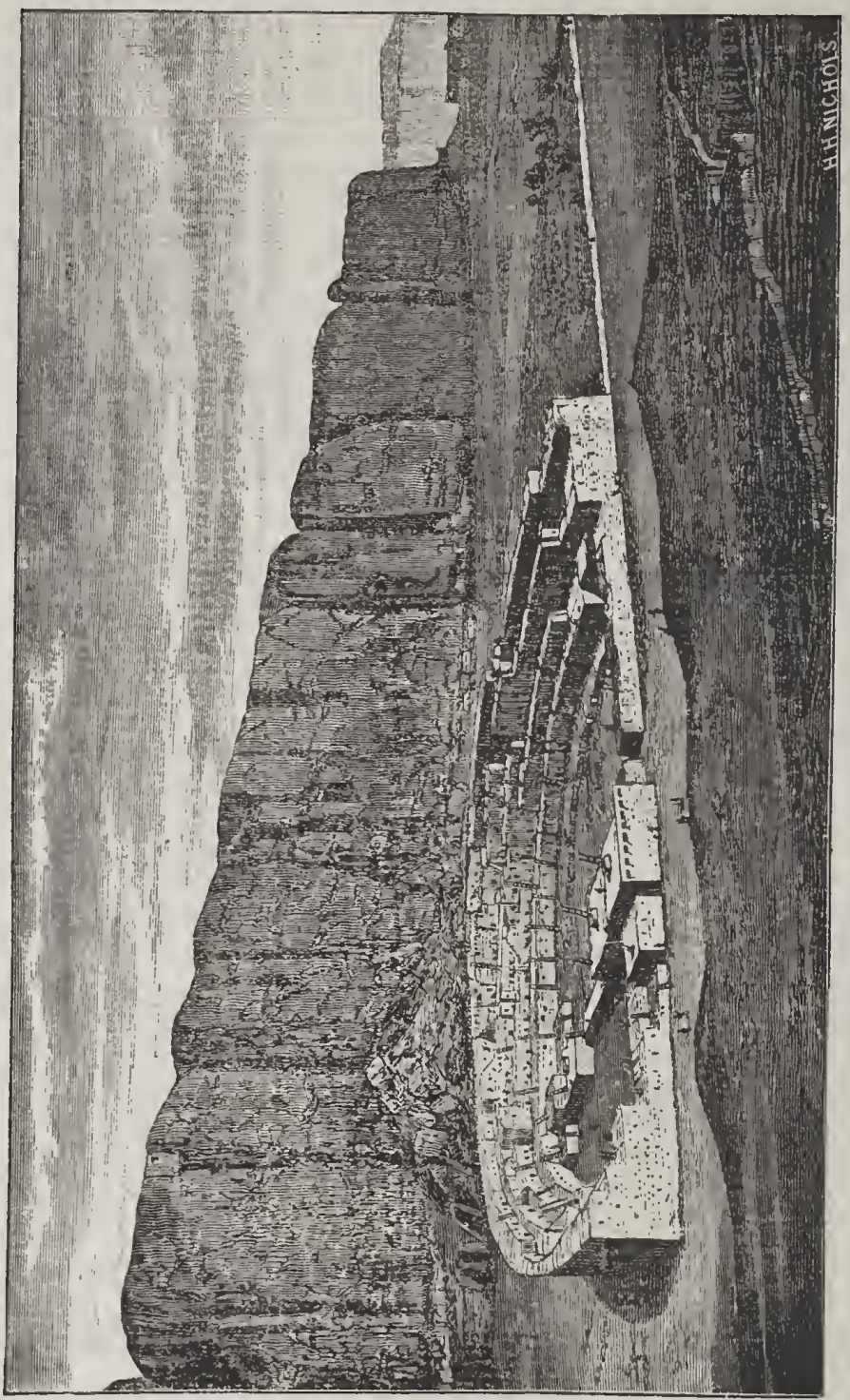

Fig. 54. Reconstruction of Pueblo Bonito, Chaco Canyon, New Mexico. Morgan, 1881. I

parts in the textile and ceramic art of their respective localities. Yet, the distinction remains, that secondary embellishment, or what is often considered true architecture, is characteristic only of the Maya type.

Associated with the foregoing culture were no less worthy feats of highway and drainage construction, particularly by the two great military cultures, the Nahua and Inca. In Peru, roads were paved and graded and brooks spanned by stone culverts, many of which are still in use.[7] These were necessarily formed by huge stone slabs supported by piers. Chasms were bridged by true suspension bridges and in some cases crossed in chairs running on cables. Even a kind of pontoon bridge was in use. In Mexico, the country was less rugged, but the roads were excellent. In both regions the irrigation and aqueduct systems are famous. As all travel was by foot, and only in Peru were pack animals used, these road builders had a somewhat different problem than confronted the users of carts in the Old World.

As we proceed southward in Peru, architecture rapidly deteriorates, disappearing altogether at the River Maule. Thence toward the east in the neighborhood of the Calchaqui, we find rough stone structures of many rooms, not unlike one-story pueblos. Burial is now in urns without true mounds, but many small carved monoliths have come to notice. Once out into the guanaco area we find the simplest kind of skin tent, which in the far south becomes merely a windbreak (Fig. 72). Throughout the Amazon, on the north coast and southward as far as the Suyas, hammocks are in general use and the houses are frequently primitive. On the other hand, very large thatched structures are found, under which, as under one great shed, lives the whole community. So far, there seems to be no consistent distribution of varieties of this type, some are oval and well thatched, some square, and some mere roof shelters. In fact, the only thing essential is a hammock to keep one off the ground and a roof overhead. The whole population is rather nomadic. As we go eastward through the highlands of Venezuela, the court structures of Colombia disappear, but still the prevailing form is the rec-

tangular hut; but in Guiana we begin to encounter the oval thatched house of Brazil. Of some interest are the pile-dwellings of the north coast, now almost extinct, though a few survive in swamps and even on dry land. In some of the inundated districts floating houses are found. Finally, the meager archæological data we have reveal only one important site at the mouth of the Amazon where mound structures have been reported.

The structure of habitations in the United States and Canada has been carefully studied so that we can make very definite statements as to the types and their distributions.[8] Nowhere outside of the frontier to the Pueblo area do we find buildings of stone until we reach the Eskimo. Consequently, there is very little content to the archæology of architecture, our data being almost exclusively from the surviving tribes. The only building that reminds us of the traits we have discussed in our consideration of the area of intense maize culture was found in the lower Mississippi Valley, a rectangular house with walls of clay reinforced by wattling. Sometimes, as in Arkansas, there were two or three rooms suggesting the houses of Colombia, but these were not the prevailing type on the lower Mississippi.

The Gulf States form a fairly distinct house area. Particularly on the Atlantic side were curious oblong rectangular houses with curved, or bowed, roofs. Their construction was simple, a framework of light poles, lashed into place, with coverings of bark or thatch. (For type illustrations see the *Handbook of American Indians.*) In the Florida swamps a kind of platform pile-dwelling is found, with roof and open sides reminding one of Guiana types. A very widely distributed structure is an oval dome-shaped house, plastered over with mud, with no opening except the door. In fact, none of these southern houses seems to have been provided with smoke holes, most of the cooking being done out-of-doors.

In northeastern United States the prevailing form among the Algonkin tribes was a low, oval framework of poles covered with bark, mats, or thatch, according to the season and locality. The Iroquois of New York, who are generally regarded as of

southern origin, lived in long, rectangular, bark-covered communal houses known in local literature as the "long houses."[9] The structural similarity of this to one of the southern types is obvious. West of Lake Michigan the dome-shaped Algonkin house often gave way to a rectangular one with a flat roof, and among the Eastern Dakota we meet with this form made by setting up rows of posts in the ground. A little farther west on the Missouri we have what is usually called an earth-lodge, a circular, conical-roofed framework covered with thatch and finally with turf.[10] However, its distribution is restricted in the main to Caddoan and Siouan tribes of bison hunters, who also raised some maize.

Next, we have a well-known type of shelter to which the Dakota name, *tipi*, is usually applied. In the East, it appears in northern New England, extending up into Labrador, thence eastward through the great Cree and Ojibway range, well up into the Canadian Northwest. Also, it sweeps down into the bison area, reaching some of the nomadic peoples of the Pueblo area and again invading the salmon area in Oregon and Washington. The other forms of shelter we have noted have all but disappeared, while the *tipi* is still used by the surviving tribes of this great area. These conditions tend to make it the most typical Indian shelter, and it now has so firm a place in the popular mind that it is used in art and story, regardless of the locality. Not infrequently we see pictures of Pocahontas, Henry Hudson on Manhattan, and even of California incidents associated with *tipis*, a form of shelter entirely inappropriate. The term wigwam in Colonial literature is the Algonkin name for the oval bark-covered house we have described, and the modern tendency to apply the same name to the *tipi* has led to great confusion.

It is not to be expected that we shall find a single type of *tipi* prevailing throughout. The essential structural concept is a tripod of poles, supporting other poles forming a cone.[11] The base tripod is formed by binding together three or four poles, but in far western Canada these poles sometimes have interlocking forks, a feature also noted in southern Nevada and in the older type of Navajo hogan. Where birch trees

grow, the cover is birchbark; in the bison area it is skins. The Ojibway, however, often used mats, as was sometimes the case on the Columbia River. In the far North, we find a pointed skin tent, even forming a summer dwelling for the Eskimo.

For the details of varieties of *tipi* and their distribution we must refer the reader to the special literature. We note that it seems to follow the outlines of the caribou and bison-hunting areas and is everywhere definitely associated with a nomadic hunting life, for many tribes on the borders used it only when on hunting trips. Its origin and development, therefore, is one of the important problems in our subject and must receive close attention in the future. Curiously enough, the *tipi* is found in Siberia and has analogous forms in northern Europe, suggesting the possibility of its definite association with reindeer culture.

We have now covered the whole of the northern continent except the western part and the Arctic. The most distinctive structures here are the wooden totem-pole houses of the North Pacific Coast, reaching their highest development among the Haida and Tlingit.[12] The structural plan consists of four massive, upright timbers supporting two long, equally heavy beams. These are placed parallel about four feet apart and are essentially ridge poles. Around these a rectangular enclosure is made by setting split planks upon end. The ends are gabled and the roof of planks. The only framework is the massive central support, in contrast to which the remainder of the building appears flimsy in the extreme. But we find one feature not so far observed north of the Nahua area, namely, architectural embellishment. The four interior posts are carved in high relief, and outside is the famous totem pole. Paint is used to reinforce the carving, and in addition the front of the house is decorated with one of those curious spread-out animal forms we have noted in the preceding chapter. Had these people carved in stone instead of wood, we should now find their country one of our richest archæological fields, but the perishable nature of their building material has left no records of their past history.

The influence of this type of architecture reaches northern California, for though the heavy carved timbers have a central distribution only, we find the rectangular house of upright planks, with a circular door throughout the coastal belt of Oregon and Washington. In Canada it invades the mountainous area of the Déné, but in Alaska it stops rather suddenly.

Central and southern California present simple but various forms of shelter.[13] Yet, they may be characterized as shelters of brush and tule reeds. More permanent houses are sometimes formed by setting up poles over slight excavations. Toward the interior we meet with the great Shoshoni range, the characteristic shelter of which is a simple brush-covered lodge. Two forms occur, the precise distribution of which is not yet known, but the prevailing one seems to be a low dome-shaped, grass-covered affair still encountered among the Comanche and the Apache. The other type we have mentioned is a pointed brush shelter upon a tripod of forked poles, a form closely allied to the Navajo hogan and perhaps to the *tipi*.

Strictly considered, none of these houses so far described can be classed as underground. Yet, some approach this qualification in that they have sunken floors. Thus, in California, the house is often over a shallow pit, and elsewhere it was common to remove the surface soil to expose the clay or other hard layer, loam being too powdery when dry to make a good floor. However, when we turn to the inland Salish tribes of British Columbia, we meet a more distinctly underground house entered through the smoke-hole at the center by a stepped ladder.[14] The distribution of this form centers very closely among the inland Salish who may, therefore, be considered its originators. The next place where we encounter a subterranean house is among the Eskimo of Alaska. In this case we have two ways of entering: through the smoke-hole, and by a long covered trench, each used according to the season. The Eskimo house, however, is often set over a very shallow excavation and earth heaped over its framework like the earth-lodge of the Missouri. This form of house extends eastward beyond the mouth of the Mackenzie, but from there

on timber is too scarce. Stone houses were noted by Stefánsson near Coronation Gulf, and their distribution from that point eastward seems to be continuous. Their roofs are usually of skins, often supported by whale ribs. The snowhouse we all know so well is universal from east to west as a temporary residence, which in summer gives way to a small skin tent. Its long, low, tunnel-like entrance and internal arrangement is the same as that for the earth-covered type of Alaska, and both together may be regarded as revealing the characteristic Eskimo house concept.

Jochelson [15] has brought together some data for a historical connection between the earth-covered houses of the Old and New Worlds. While it is clear that examples of such dwellings are found intermittently from Europe, across Asia, to America, we do not find the definite structural parallels necessary to form satisfactory conclusions regarding their historical relations. Archæological work has brought to light a somewhat more extensive distribution of such houses in America. Numerous depressions in the upper half of the Ohio Valley have been regarded as old house sites and recently Sterns [16] located rectangular house pits in Nebraska, but, except in the last case, our knowledge is not definite, and the very perishable nature of the structures so far observed makes further discovery extremely difficult.

In conclusion, attention may be called to one peculiarity of aboriginal house construction. The chimney was unknown. Not even the skilled architects of Mexico and Peru seemed to have hit upon the idea. It is true that in the historic pueblos they are found, but this is generally attributed to Spanish influence. In the older type of pueblo structure only the rooms having open roofs were used as living quarters. Hence, the universal American way of heating a house is by an open hearth at the center with a hole in the roof immediately above.

Fortifications may also be considered under the general head of architecture. At the time of discovery the native villages in the southern half of the eastern maize area were circled by palisades. In the north, the Iroquois possessed such

fortified towns and even in New England they were known.[17] It is now considered that certain rings of earth in New York State mark the sites of palisaded villages, and there is reason to believe that similar redoubts in the Ohio Valley had a like origin. The palisade was used as far up the Missouri as the Mandan villages. In fact, the distribution of palisaded villages is about coincident with maize culture in the East. The only other place for which palisades are reported is the North Pacific Coast, though the usual form in that region was a high rock with overhanging platforms like a blockhouse. Nowhere else do we find fortifications until we reach the Pueblo area. It is true that a number of earthworks are designated as forts, but their use as such is largely hypothetical. Perhaps the best-known example is Fort Ancient in Ohio. In the Pueblo region the houses were so placed, either in cliff recesses, upon mesas, or piled upon each other in such manner as to make other defensive works unnecessary.

In the Antilles and eastern South America the palisaded village was known, but we have no record of other kinds of defensive works. It is, however, important to note that we have here a continuity of at least one trait for the eastern halves of both continents.

Naturally the great military empires of Mexico and Peru developed fortifications. In the former, the road from Tlaxcala to Mexico City was defended by a stone wall about six miles long, faced by a ditch.[18] The internal citadel of the defense works at Mexico City was about the temple of Tenochtitlan, surrounded by a wall six feet high, where the last stand against Cortez was made. Strange to say, the great ruined cities of the Maya show no definite fortifications. It is, however, in the Inca territory that the greatest systems of defense appear.[19] Important points on roads were guarded by blockhouses, cities were defended by systems of outlying forts, etc. The most famous fortresses are Ollantaitambo and Sacsahuaman. The latter is distinguished for its remarkable masonry and the former for its internal passages cut in solid rock.

1. Spinden, 1913. I.
2. Holmes, 1895–1897. I.
3. Joyce, 1912. I.
4. Holmes, 1895–1897. I.
5. Thompson, 1911. I.
6. Joyce, 1912. I.
7. Markham, 1910. I.
8. Morgan, 1881. I.
9. Morgan, 1881. I.
10. Fletcher and La Flesche, 1911. I; Spinden and Will, 1906. I.
11. Wissler, 1910. I.
12. Emmons, 1916. I.
13. Kroeber, 1904. I.
14. Teit, 1900. I.
15. Jochelson, 1908. I.
16. Sterns, 1915. I.
17. Willoughby, 1906. I.
18. Joyce, 1914. I.
19. Markham, 1910. I.

CHAPTER VII

WORK IN STONE AND METALS

It is frequently said that the whole of the New World was at the time of discovery still in the stone age. This is an unjust estimate of the metallurgic development in Mexico and Peru, but is true in a certain sense, since some stone tools were still in use even at the most advanced metallic centers. Outside the region of high culture the characterization holds and, even at the present moment, stone-age culture survives among a few outlying remnants of the aboriginal population. The gradual displacement of stone tools by trade gave opportunities for the actual observation of their fabrication paralleled in no part of the continental Old World. For, although we have from western Europe a remarkable chronological series of stone implements in which it is believed the several steps in their development can be differentiated, it is practically impossible to tell exactly how the work was done. Since we find in America somewhat analogous forms made from similar materials, the tendency has been to interpret European specimens by American data.

In Europe we find one distinction not at all applicable to our subject. Stone work there is clearly divided into two successive periods, that in which chipping alone occurs and that in which polishing predominates; while in practically all parts of the New World we find the two processes in simultaneous use. In the main, the stone industry of every social group comprises the following different methods: chipping, or flaking; abrading, or pecking; grinding and polishing; sawing and drilling.

The process used is dependent upon the materials. Thus any stone like flint, which has the property of conchoidal fracture, is flaked. While the precise manipulations seem to differ according to locality, the essential procedure is every-

where the same. A pebble is first brought to a generalized or blank form, by striking with a hammerstone. From this the desired implement is worked out, the fine chipping being by hand pressure with an antler or bone blunt-pointed tool. Holmes,[1] our leading experimental archæologist, has worked out in his laboratory many of the necessary processes, which, in the main, agree with those observed among living peoples.[2]

Fig. 55. Pebbles Showing the Process of Abrading, or Pecking. Boas, 1909. I

For pecking, our best data are from the Nootka of Vancouver Island, who occasionally resorted to it as late as twenty-five years ago.[3] As shown in the figure, parallel grooves were battered in the pebble to be shaped, then the intervening ridges pecked away, and so on. The battering tool was a long, oval pebble of tough, hard stone. When the approximate shape of the desired implement had been attained, it was finished by grinding on suitable stones.

This seems to have been the method employed wherever polished tools of similar materials have been found. But nephrite, the fine, green, jade-like stone found on the North Pacific Coast and in Central America, cannot be worked in this way. It can only be cut and ground. Again, our best data are from Canada and Alaska. The Eskimo successfully sawed off pieces of the required shape by the use of thongs and sand and water; in short, the same principle as is employed

in modern stone cutting. From unfinished pieces in collections and the fine examples unearthed by Smith,[4] it appears that the final separation of the block was by fracture produced by wedging.

As to drilling and perforating, our data are less complete. Soft stones, like slate, were drilled with stone points. By ex-

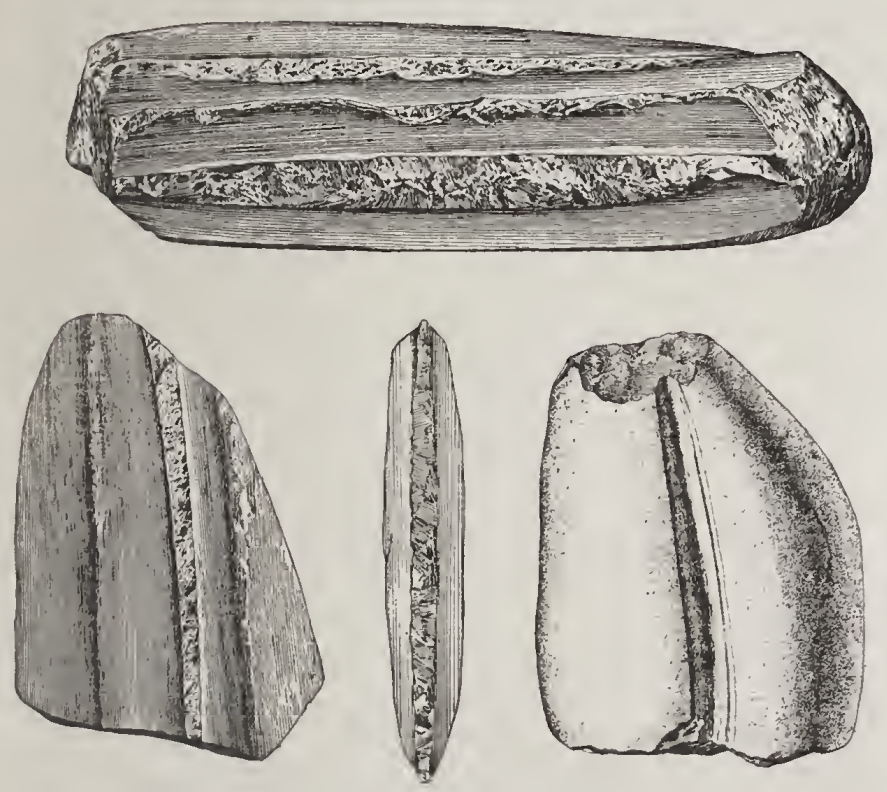

Fig. 56. Pieces of Nephrite Showing the Method of Cutting and Breaking. Smith, H. I., 1899. I

perimental methods Rau[5] has reconstructed the process of drilling with a hollow reed and sand, which accounts for the unfinished borings with attached cores we sometimes find in museums. Again, the Nootka[6] made large perforations by pecking. First, a pit was formed in the stone to be perforated, into which a hard pebble was laid and pounded upon until the hole reached the middle; then the stone was inverted and the process repeated.

The fine sculptures of the Maya were executed with stone tools. We can safely assume, therefore, that all the stone work of the New World belongs strictly to a stone age and was such as could, and in the main was, accomplished without the use of metal tools.

TYPES OF ARTIFACTS

Our next task is to enumerate the most distinctive types of stone artifacts and their respective distributions. The most universal is the arrow-head, which, though of many varieties, tends to take the generalized triangular form. The notched head is found in both continents, but is strikingly absent from Eskimo collections. By paying minute regard to size, secondary form, and materials, it has been possible to draw some distinctions between the arrow-heads from different parts of the two continents, but such study has not advanced to a point where a summary can be made.[7] The fact is that the difficulties of observing consistent distinctions are so great as to be discouraging. Nor do we find any great divergence from the arrow-heads of the Old World, for somewhat similar notched forms are common in Neolithic deposits. On the other hand, the fact that they do not occur in Paleolithic culture may have a significant bearing upon the history of our continent.

Lance heads and even knives are often indistinguishable from arrow-heads except as to size. Another closely related instrument is the drill. If we add to these, scrapers and a few gravers, we about exhaust the list of analogous tools.

Chipping, in particular, lends itself to fanciful productions and we often find in our collections from both continents many unusual objects. This work has been greatly stimulated by the modern tourist trade.

While the celt and the gouge from America cannot readily be distinguished from those of Neolithic Europe, or any other part of the world, the grooved ax (Fig. 77) is so far unique, though a single specimen has been found in China.[8] Yet its distribution in the New World is rather restricted, even if we include all implements hafted by a groove. For we find this

grooved ax to be rare in South America, so far having been reported only for Ecuador. In North America the grooved ax is not found on the Pacific side, but is first met with among the Pueblos and bison-hunting tribes, though with the latter it is usually a hammer that is grooved. In the eastern maize area it is frequently met with. In Mexico and Central America it is relatively infrequent, and in the Greater Antilles is not found at all. On the other hand, neither the Eskimo nor the Siberians seem to make use of this principle of hafting.

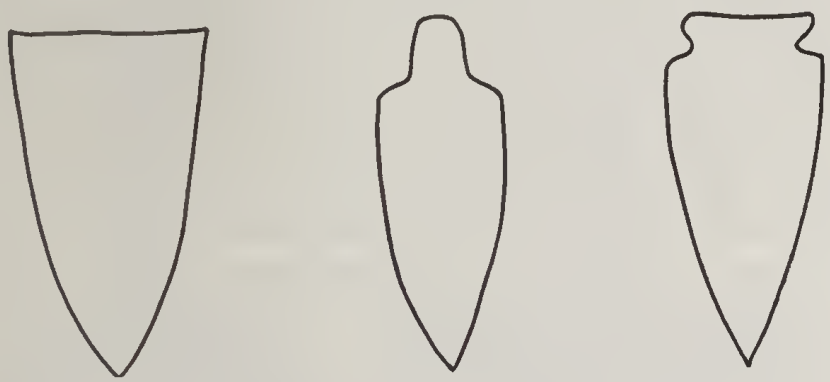

Fig. 57. Common Types of Arrow-Head

The highly developed tribes of the North Pacific Coast use a grooved hammer, but in some cases a transverse hole is made, through which the binding is run. The important principle in hafting here is the holding of the flat face of the tool against a similar surface on the end of the handle, as in the adze. Curiously enough, this method has a distribution not quite the same as that of grooved tools. In Siberia, Alaska, and on the North Pacific Coast, where the adze is common, hammers are hafted in this same way, but in the Pueblo and Plains regions the tendency is to twine the handle around the entire tool. Then, in the eastern maize area the grooved ax again bears the hafting shoulder, as also seems to be the case in Ecuador.

That east of the Mississippi, celts were hafted and used as axes is clear from a few specimens found in swamps.[9] In these cases, the wedge-shaped top of the celt is put in a hole through the wooden handle.

The other most important group of tools is that passing under the name of knife. From the Eskimo, particularly in Alaska, we have a knife for carving formed by setting a small flake in the lower edge of a bone handle. Similar knives have been found along the Upper Missouri,[10] the significance of which is not clear. Among the Eskimo on the North Pacific Coast, and in the northern part of the eastern maize area, we find knives of slate, a material which takes a very keen edge, but does not wear well. The semilunar knife of the Eskimo is usually of slate and is found in the St. Lawrence Valley as well. In Peru, we find the same form in copper and bronze. Chipped blades were used as knives in all parts of both continents. The large, fine, obsidian blades of Mexico are the most famous.

An implement of unique character is the pitted hammerstone, the precise distribution of which cannot be stated.[11] The stone pestle is essentially a hand hammer, and is found in all parts of the northern continent, except possibly in the heart of the bison and caribou areas. Detached stone mortars are a feature of the Pacific Coast, though in California they are usually mere holes in large boulders. In the interior and the east stone mortars are rare. Both in the Plains and in California, we find flat stones with skin and basketry hoppers, respectively. In the eastern maize area the mortars were usually of wood, as also in eastern South America.

A particularly characteristic object in the culture of the New World is the stone pipe, the forms and distributions of which have been extensively treated by McGuire.[12] In the main, there are two types of stone pipe, the common or elbow form, and the tubular pipe. The former has a wide distribution over the eastern half of the United States, extending into Canada and northwestward to the Pacific. It does not occur with any frequency in the West Indies and northern South America, but is fairly abundant in eastern Brazil and Argentina. The tubular stone pipe, on the other hand, is found in the western part of the United States and is the exclusive form in the highland region from British Columbia to the Rio Grande; it is even occasionally met with in the Mississippi Valley. However, in Arizona and New Mexico, it begins to give way to the

tube of cane which prevails in Mexico and Central America (Fig. 8). The center of development for highly carved stone pipes is the eastern half of the Mississippi drainage.

Of special and frequently problematical stone objects we have a long list. In North America, the bannerstone (Fig. 81) and the discoidal (Fig. 82) are common on the Atlantic side. The Columbia River Valley also presents a large number of curiosities, such as stone weights, tool handles, monkey heads,

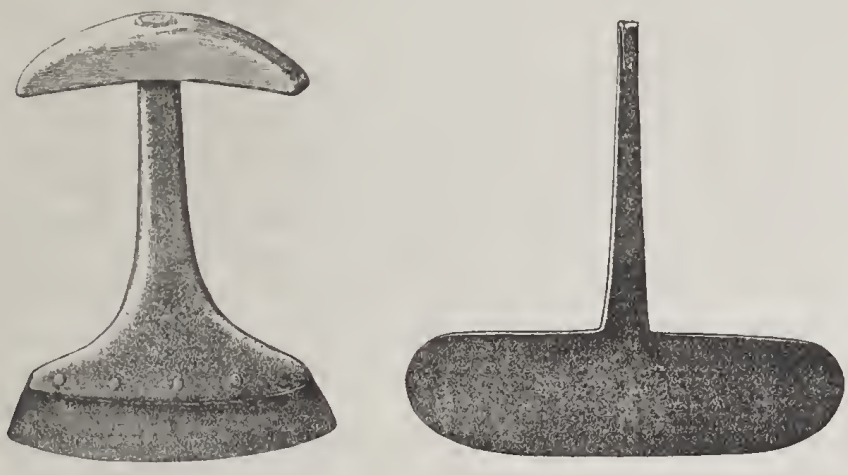

Fig. 58. Knives of Copper from the Eskimo of North America and the Inca of Peru, respectively

etc., perhaps a greater variety than any other region. In the Antilles we have large, curious rings or collars, and in Mexico, yokes. Central America yields carved jadeite celts and animal-shaped metates. From Ecuador come large stone seats and from Peru curious carvings in stone, suggesting appliances for a game of chance. The small area about Catamarca, Argentina, produces a curious mace-like object and in eastern South America we find a large, finely formed ax. The distribution of these forms presents many interesting problems for which the reader must turn to the special literature.

Among questions of wider interest is that of steatite work. The making of steatite vessels was a prominent industry on the Atlantic side of North America. In New England and